SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30

1. REQUISITION NUMBER: PR-ORD-18-00381

PAGE 1 OF 13

2. CONTRACT NO.

3. AWARD/ EFFECTIVE DATE

4. ORDER NUMBER: 68HE0H18P0112

5. SOLICITATION NUMBER

6. SOLICITATION ISSUE DATE

7. FOR SOLICITATION INFORMATION CALL:
a. NAME: Keith Westry
b. TELEPHONE NUMBER (No collect calls): 202-564-9863

8. OFFER DUE DATE/LOCAL TIME

9. ISSUED BY CODE HPOD

HPOD
US Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 3803R
Washington DC 20460

10. THIS ACQUISITION IS ☐ UNRESTRICTED OR ☒ SET ASIDE: 100.00 % FOR:
☒ SMALL BUSINESS
☐ HUBZONE SMALL BUSINESS
☐ SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS
☐ WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED SMALL BUSINESS PROGRAM
☐ EDWOSB
☐ 8(A)
NAICS: 541199
SIZE STANDARD: $11.0

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED
☒ SEE SCHEDULE

12. DISCOUNT TERMS

☐ 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)

13b. RATING

14. METHOD OF SOLICITATION
☐ RFQ ☐ IFB ☐ RFP

15. DELIVER TO CODE HPOD

HPOD
US Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 3803R
Washington DC 20460

16. ADMINISTERED BY CODE HPOD

HPOD
US Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 3803R
Washington DC 20460

17a. CONTRACTOR/ OFFEROR CODE 039545025 FACILITY CODE

WEISS & MOY, P.C.
Attn: Veronica-Adele R Cao
4204 N. BROWN AVE.
SCOTTSDALE AZ 852513914

TELEPHONE NO. 4809948888

☐ 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18a. PAYMENT WILL BE MADE BY CODE RTP FMC

RTP Finance Center
US Environmental Protection Agency
RTP-Finance Center (AA216-01)
109 TW Alexander Drive
www2.epa.gov/financial/contracts
Durham NC 27711

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED ☐ SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	DUNS Number: 039545025 Max Expire Date: 06/19/2021 InvoiceApprover: Carme Krieger Period of Performance: 06/20/2018 to 06/19/2021				
0001	BASE: Patent Application for EPA Case No.#801-17 (Zimmer), Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications. CLIN 0001 is Firm Fixed Priced.				8,420.00

(Use Reverse and/or Attach Additional Sheets as Necessary)

25. ACCOUNTING AND APPROPRIATION DATA
See schedule

26. TOTAL AWARD AMOUNT *(For Govt. Use Only)*
$24,998.00

☐ 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA ☐ ARE ☐ ARE NOT ATTACHED.
☐ 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA ☐ ARE ☐ ARE NOT ATTACHED.

☐ 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN _____ COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED.

☐ 29. AWARD OF CONTRACT: _____ OFFER DATED _____. YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR

31a. UNITED STATES OF AMERICA *(SIGNATURE OF CONTRACTING OFFICER)*

30b. NAME AND TITLE OF SIGNER *(Type or print)*

30c. DATE SIGNED

31b. NAME OF CONTRACTING OFFICER *(Type or print)*
Keith Westry

31c. DATE SIGNED

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	Delivery: 06/28/2018 Accounting Info: 18-19-C-26CL000-000FK8-2585-26A5E-1826CLE014-001 BFY: 18 EFY: 19 Fund: C Budget Org: 26CL000 Program (PRC): 000FK8 Budget (BOC): 2585 Cost: 26A5E DCN - Line ID: 1826CLE014-001 Funding Flag: Complete Funded: $6,325.00 Accounting Info: 18-19-C3-26CL000-000FK8-2585-26A5E-1826CLE014-002 BFY: 18 EFY: 19 Fund: C3 Budget Org: 26CL000 Program (PRC): 000FK8 Budget (BOC): 2585 Cost: 26A5E DCN - Line ID: 1826CLE014-002 Funding Flag: Complete Funded: $2,095.00 Period of Performance: 06/20/2018 to 06/28/2018				
0002	Optional Task: Patent Application Follow-on Actions for EPA Case No.#801-17 (Zimmer) , as requested by the EPA, performed during this contract. Follow-on actions will be negotiated, when/if they arise, at a total FFP. Follow-on actions shall only be ordered via a modification to the purchase order. This Line item has a NTE amount of ($5,526.00). (Option Line Item) Continued ...				5,526.00

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: _____

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE
	32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT	37. CHECK NUMBER
☐ PARTIAL ☐ FINAL			☐ COMPLETE ☐ PARTIAL ☐ FINAL	

38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY *(Print)*	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER	41c. DATE	42b. RECEIVED AT *(Location)*	
		42c. DATE REC'D *(YY/MM/DD)*	42d. TOTAL CONTAINERS

NAME OF OFFEROR OR CONTRACTOR
WEISS & MOY, P.C.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	06/20/2018 Period of Performance: 06/20/2018 to 06/19/2019				
0003	Optional Task: Patent Application Follow-on Actions for EPA Case No.#801-17 (Zimmer) , as requested by the EPA, performed during this contract, as requested by the EPA, performed during this contract. Follow-on actions will be negotiated, when/if they arise, at a total FFP. Follow-on actions shall only be ordered via a modification to the purchase order. This Line item has a NTE amount of ($5,526.00). (Option Line Item) 06/20/2019 Period of Performance: 06/20/2019 to 06/19/2020				5,526.00
0004	Optional Task: Patent Application Follow-on Actions for EPA Case No.#801-17 (Zimmer) , as requested by the EPA, performed during this contract. Follow-on actions will be negotiated, when/if they arise, at a total FFP. Follow-on actions shall only be ordered via a modification to the purchase order. This Line item has a NTE amount of ($5,526.00). (Option Line Item) 06/20/2020 Period of Performance: 06/20/2020 to 06/19/2021				5,526.00

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SECTION 1 - Clauses

1-1 Clauses

Clause List

1-2 FAR 52.204-7 SYSTEM FOR AWARD MANAGEMENT. (OCT 2016)

1-3 FAR 52.212-4 CONTRACT TERMS AND CONDITIONS - COMMERCIAL ITEMS. (JAN 2017)

1-4 FAR 52.225-25 PROHIBITION ON CONTRACTING WITH ENTITIES ENGAGING IN CERTAIN ACTIVITIES OR TRANSACTIONS RELATING TO IRAN-REPRESENTATION AND CERTIFICATIONS. (OCT 2015)

1-5 FAR 52.233-3 PROTEST AFTER AWARD. (AUG 1996)

1-6 EPAAR 1552.211-79 COMPLIANCE WITH EPA POLICIES FOR INFORMATION RESOURCES MANAGEMENT. (JUL 2016)

1-7 FAR 52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS - COMMERCIAL ITEMS. (NOV 2017)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) 52.203-19, Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (JAN 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).

(2) 52.209-10, Prohibition on Contracting with Inverted Domestic Corporations (NOV 2015).

(3) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).

(4) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Public Laws 108-77 and 108-78 (19 U.S.C. 3805 note)).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: (Contracting Officer check as appropriate.)

[ ] (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (SEP 2006), with Alternate I (OCT 1995) (41 U.S.C. 4704 and 10 U.S.C. 2402).

[X] (2) 52.203-13, Contractor Code of Business Ethics and Conduct (OCT 2015) (41 U.S.C. 3509).

[ ] (3) 52.203-15, Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (JUN 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)

[ ] (4) 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards (OCT 2016) (Pub. L. 109-282) (31 U.S.C. 6101 note).

(5) (Reserved)

[ ] (6) 52.204-14, Service Contract Reporting Requirements (OCT 2016) (Pub. L. 111-117, section 743 of Div. C).

[ ] (7) 52.204-15, Service Contract Reporting Requirements for Indefinite-Delivery Contracts (OCT 2016) (Pub. L. 111-117, section 743 of Div. C).

[X] (8) 52.209-6, Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment. (OCT 2015) (31 U.S.C. 6101 note).

[X] (9) 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matters (JUL 2013) (41 U.S.C. 2313).

[ ] (10) (Reserved)

[ ] (11)(i) 52.219-3, Notice of HUBZone Set-Aside or Sole-Source Award (NOV 2011) (15 U.S.C. 657a).

[ ] (ii) Alternate I (NOV 2011) of 52.219-3.

[ ] (12)(i) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (OCT 2014) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).

[ ] (ii) Alternate I (JAN 2011) of 52.219-4.

[ ] (13) (Reserved)

[ ] (14)(i) 52.219-6, Notice of Total Small Business Set-Aside (NOV 2011) (15 U.S.C. 644).

[ ] (ii) Alternate I (NOV 2011).

[ ] (iii) Alternate II (NOV 2011).

[ ] (15)(i) 52.219-7, Notice of Partial Small Business Set-Aside (JUN 2003) (15 U.S.C. 644).

[ ] (ii) Alternate I (OCT 1995) of 52.219-7.

[ ] (iii) Alternate II (MAR 2004) of 52.219-7.

[ ] (16) 52.219-8, Utilization of Small Business Concerns (NOV 2016) (15 U.S.C. 637(d)(2) and (3)).

[ ] (17)(i) 52.219-9, Small Business Subcontracting Plan (JAN 2017) (15 U.S.C. 637(d)(4)).

[ ] (ii) Alternate I (NOV 2016) of 52.219-9.

[ ] (iii) Alternate II (NOV 2016) of 52.219-9.

[ ] (iv) Alternate III (NOV 2016) of 52.219-9.

[ ] (v) Alternate IV (NOV 2016) of 52.219-9.

[ ] (18) 52.219-13, Notice of Set-Aside of Orders (NOV 2011) (15 U.S.C. 644(r)).

[X] (19) 52.219-14, Limitations on Subcontracting (JAN 2017) (15 U.S.C. 637(a)(14)).

[ ] (20) 52.219-16, Liquidated Damages-Subcontracting Plan (JAN 1999) (15 U.S.C. 637(d)(4)(F)(i)).

[ ] (21) 52.219-27, Notice of Service-Disabled Veteran-Owned Small Business Set-Aside (NOV 2011) (15 U.S.C. 657f).

[ ] (22) 52.219-28, Post Award Small Business Program Rerepresentation (JUL 2013) (15 U.S.C. 632(a)(2)).

[ ] (23) 52.219-29, Notice of Set-Aside for, or Sole Source Award to, Economically Disadvantaged Women-Owned Small Business Concerns (DEC 2015) (15 U.S.C. 637(m)).

[ ] (24) 52.219-30, Notice of Set-Aside for, or Sole Source Award to, Women-Owned Small Business Concerns Eligible Under the Women-Owned Small Business Program (DEC 2015) (15 U.S.C. 637(m)).

[X] (25) 52.222-3, Convict Labor (JUN 2003) (E.O. 11755).

[X] (26) 52.222-19, Child Labor-Cooperation with Authorities and Remedies (OCT 2016) (E.O. 13126).

[ ] (27) 52.222-21, Prohibition of Segregated Facilities (APR 2015).

[X] (28) 52.222-26, Equal Opportunity (SEP 2016) (E.O. 11246).

[ ] (29) 52.222-35, Equal Opportunity for Veterans (OCT 2015) (38 U.S.C. 4212).

[ ] (30) 52.222-36, Equal Opportunity for Workers with Disabilities (JUL 2014) (29 U.S.C. 793).

[ ] (31) 52.222-37, Employment Reports on Veterans (FEB 2016) (38 U.S.C. 4212).

[X] (32) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496).

[X] (33)(i) 52.222-50, Combating Trafficking in Persons (MAR 2015) (22 U.S.C. chapter 78 and E.O. 13627).

[ ] (ii) *Alternate I* (MAR 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627).

[ ] (34) 52.222-54, Employment Eligibility Verification (OCT 2015). (E. O. 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial items as prescribed in 22.1803.)

[ ] (35)(i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Items (MAY 2008) (42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

[ ] (ii) Alternate I (MAY 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

[ ](36) 52.223-11, Ozone-Depleting Substances and High Global Warming Potential Hydrofluorocarbons (JUN 2016) (E.O. 13693).

[ ](37) 52.223-12, Maintenance, Service, Repair, or Disposal of Refrigeration Equipment and Air Conditioners (JUN 2016) (E.O. 13693).

[ ] (38)(i) 52.223-13, Acquisition of EPEAT®-Registered Imaging Equipment (JUN 2014) (E.O.s 13423 and 13514).

[ ] (ii) Alternate I (OCT 2015) of 52.223-13.

[ ] (39)(i) 52.223-14, Acquisition of EPEAT®-Registered Televisions (JUN 2014) (E.O.s 13423 and 13514).

(ii) Alternate I (JUN 2014) of 52.223-14.

[ ] (40) 52.223-15, Energy Efficiency in Energy-Consuming Products (DEC 2007) (42 U.S.C. 8259b).

[ ] (41)(i) 52.223-16, Acquisition of EPEAT®-Registered Personal Computer Products (OCT 2015) (E.O.s 13423 and 13514).

[ ](ii) Alternate I (JUN 2014) of 52.223-16.

[X] (42) 52.223-18, Encouraging Contractor Policies to Ban Text Messaging While Driving (AUG 2011)

[ ] (43) 52.223-20, Aerosols (JUN 2016) (E.O. 13693).

[ ] (44) 52.223-21, Foams (JUN 2016) (E.O. 13693).

[ ] (45)(i) 52.224-3, Privacy Training (JAN 2017) (5 U.S.C. 552a).

[ ] (ii) Alternate I (JAN 2017) of 52.224-3.

[ ] (46) 52.225-1, Buy American-Supplies (MAY 2014) (41 U.S.C. chapter 83).

[ ] (47)(i) 52.225-3, Buy American-Free Trade Agreements-Israeli Trade Act (MAY 2014) (41 U.S.C. chapter 83, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, 19 U.S.C. 3805 note, 19 U.S.C. 4001 note, Pub. L. 103-182, 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, 110-138, 112-41, 112-42, and 112-43.

[ ] (ii) Alternate I (MAY 2014) of 52.225-3.

[ ] (iii) Alternate II (MAY 2014) of 52.225-3.

[ ] (iv) Alternate III (MAY 2014) of 52.225-3.

[ ] (48) 52.225-5, Trade Agreements (OCT 2016) (19 U.S.C. 2501, *et seq*., 19 U.S.C. 3301 note).

[ ] (49) 52.225-13, Restrictions on Certain Foreign Purchases (JUN 2008) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

[ ] (50) 52.225-26, Contractors Performing Private Security Functions Outside the United States (Oct 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. 2302 Note).

[ ] (51) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (NOV 2007) (42 U.S.C. 5150).

[ ] (52) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (NOV 2007) (42 U.S.C. 5150).

[ ] (53) 52.232-29, Terms for Financing of Purchases of Commercial Items (FEB 2002) (41 U.S.C. 4505, 10 U.S.C. 2307(f)).

[ ] (54) 52.232-30, Installment Payments for Commercial Items (JAN 2017) (41 U.S.C. 4505, 10 U.S.C. 2307(f)).

[ ] (55) 52.232-33, Payment by Electronic Funds Transfer-System for Award Management (JUL 2013) (31 U.S.C. 3332).

[ ] (56) 52.232-34, Payment by Electronic Funds Transfer - Other than System for Award Management (JUL 2013) (31 U.S.C. 3332).

[ ] (57) 52.232-36, Payment by Third Party (MAY 2014) (31 U.S.C. 3332).

[ ] (58) 52.242-5, Payments to Small Business Subcontractors (JAN 2017)(15 U.S.C. 637(d)(12)).

[ ] (59)(i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (FEB 2006) (46 U.S.C. Appx. 1241(b) and 10 U.S.C. 2631).

[ ] (ii) Alternate I (APR 2003) of 52.247-64.

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items: (Contracting Officer check as appropriate.)

[ ] (1) 52.222-17, Nondisplacement of Qualified Workers (MAY 2014) (E.O. 13495).

[X] (2) 52.222-41, Service Contract Labor Standards (MAY 2014) (41 U.S.C. chapter 67).

[ ] (3) 52.222-42, Statement of Equivalent Rates for Federal Hires (MAY 2014) (29 U.S.C. 206 and 41 U.S.C. chapter 67).

[ ] (4) 52.222-43, Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (Multiple Year and Option Contracts) (MAY 2014) (29 U.S.C. 206 and 41 U.S.C. chapter 67).

[ ] (5) 52.222-44, Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (MAY 2014) (29 U.S.C 206 and 41 U.S.C. chapter 67).

[ ] (6) 52.222-51, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (MAY 2014) (41 U.S.C. chapter 67).

[ ] (7) 52.222-53, Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (MAY 2014) (41 U.S.C. chapter 67).

[ ] (8) 52.222-55, Minimum Wages Under Executive Order 13658 (DEC 2015).

[X] (9) 52.222-62, Paid Sick Leave Under Executive Order 13706 (JAN 2017) (E.O. 13706).

[ ] (10) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (MAY 2014) (42 U.S.C. 1792).

[ ] (11) 52.237-11, Accepting and Dispensing of $1 Coin (SEP 2008) (31 U.S.C. 5112(p)(1)).

(d) *Comptroller General Examination of Record*. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records - Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the

settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e)(1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1) of this paragraph in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause-

(i) 52.203-13, Contractor Code of Business Ethics and Conduct (OCT 2015) (41 U.S.C. 3509).

(ii) 52.203-19, Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (JAN 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).

(iii) 52.219-8, Utilization of Small Business Concerns (NOV 2016) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $700,000 ($1.5 million for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(iv) 52.222-17, Nondisplacement of Qualified Workers (MAY 2014) (E.O. 13495). Flow down required in accordance with paragraph (l) of FAR clause 52.222-17.

(v) 52.222-21, Prohibition of Segregated Facilities (APR 2015).

(vi) 52.222-26, Equal Opportunity (SEP 2016) (E.O. 11246).

(vii) 52.222-35, Equal Opportunity for Veterans (OCT 2015) (38 U.S.C. 4212).

(viii) 52.222-36, Equal Opportunity for Workers with Disabilities (JUL 2014) (29 U.S.C. 793).

(ix) 52.222-37, Employment Reports on Veterans (FEB 2016) (38 U.S.C. 4212).

(x) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause 52.222-40.

(xi) 52.222-41, Service Contract Labor Standards (MAY 2014) (41 U.S.C. chapter 67).

(xii) [ ] (A) 52.222-50, Combating Trafficking in Persons (MAR 2015) (22 U.S.C. chapter 78 and E.O. 13627).

[ ] (B) Alternate I (MAR 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627).

(xiii) 52.222-51, Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (MAY 2014) (41 U.S.C. chapter 67).

(xiv) 52.222-53, Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (MAY 2014) (41 U.S.C. chapter 67).

(xv) 52.222-54, Employment Eligibility Verification (OCT 2015) (E. O. 12989).

(xvi) 52.222-55, Minimum Wages Under Executive Order 13658 (DEC 2015).

(xvii) 52.222-62 Paid Sick Leave Under Executive Order 13706 (JAN 2017) (E.O. 13706).

(xviii)(A) 52.224-3, Privacy Training (JAN 2017) (5 U.S.C. 552a).

(B) Alternate I (JAN 2017) of 52.224-3.

(xix) 52.225-26, Contractors Performing Private Security Functions Outside the United States (Oct 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. 2302 Note).

(xx) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (MAY 2014) (42 U.S.C. 1792). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.

(xxi) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (FEB 2006) (46 U.S.C. Appx. 1241(b) and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the Contractor May include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

1-8 FAR 52.217-8 OPTION TO EXTEND SERVICES. (NOV 1999)

The Government may require continued performance of any services within the limits and at the rates specified in the contract. These rates may be adjusted only as a result of revisions to prevailing labor rates provided by the Secretary of Labor. The option provision may be exercised more than once, but the total extension of performance hereunder shall not exceed 6 months. The Contracting Officer may exercise the option by written notice to the Contractor prior to the period of performance expiration.

(End of clause)

1-9 FAR 52.217-9 OPTION TO EXTEND THE TERM OF THE CONTRACT. (MAR 2000)

(a) The Government may extend the term of this contract by written notice to the Contractor prior to the period of performance expiration; provided that the Government gives the Contractor a preliminary written notice of its intent to extend prior to the period of performance expiration. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed Three (3) years.

(End of clause)

1-10 FAR 52.252-2 CLAUSES INCORPORATED BY REFERENCE. (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es): http://farsite.hill.af.mil/

(End of clause)

1-11 Local Clauses EPA-H-42-102 UTILIZATION OF FEDCONNECT FOR CONTRACT ADMINISTRATION

EPA will utilize the FedConnect® web portal in administering this contract. The contractor must be registered in FedConnect® and have access to the FedConnect website located at https://www.fedconnect.net/Fedconnect/. For assistance in registering or for other FedConnect® technical questions please call the FedConnect® Help Desk at (800) 899-6665 or email at support@fedconnect.net.

End of clause

CUSTOM CO ADDED INVOICES-RTP Finance

Invoices shall be prepared containing the following information: Purchase Order Number, description of commodities/services furnished, period of performance, taxpayer ID number and amount due.
Invoices shall be submitted to the address specified in block 21 of this order.
OR
Invoices shall be submitted via e-mail to RTPReceiving@epa.gov
Provide the .pdf file with the following naming convention and SUBJECT in email: SI_PO#_inv#.pdf Example: SI_EP08X00005_5335.pdf

For status of Invoice Payments, call the Financial Office's Customer Service at (919)541-0616.

The FedEx/Commercial Courier address for invoices:
U.S. Environmental Protection Agency
RTP Finance Center (AA216-01)
4930 Old Page Road
Durham, NC 27703

Vendors interested in checking the status of payments should use the Department of Treasury's Payment Advice Internet Delivery (PAID) system. It is located on the following web site and requiresregistration: http://www.fms.treas.gov/paid/index.asp

CUSTOM TAX

The Federal Government is exempted from paying taxes. The tax exempt number is 52-085-2695

SECTION 2 - List of Documents, Exhibits and Other Attachments

2-1 Attachments

List of Attachments

Attachment Number	Title
1	801-17 SOW 2017-12
2	801-17 Provisional Filing Receipt
3	801-17 Provisional Application 2017-04-28

STATEMENT OF WORK
FOR
PREPARATION AND FILING OF PATENT APPLICATION

1.0. BACKGROUND

The purpose of this requirement is to provide Legal Services for the preparation and filing of a patent application for the invention in Environmental Protection Agency (EPA) Case No. 801-17, **"Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications."** The invention was made by Anthony Zimmer of EPA. The invention discloses a core-shell material engineered both as a simulant and tracer. The inventor has not found an apparatus designed to prove a wide range of experimental results based primarily upon an aerosol generation technique known as electro-spraying like this on the market, so he believes this invention is the first of its kind. Given the current lack of understanding of transport of contaminants, a tunable simulant and/or tracer technology is needed to understand environmental contamination.

2.0. SCOPE OF WORK

The contractor shall prepare a document in the form of a United States patent application for the invention in EPA Case No. 801-17. The application must, in form and substance, comply with the U.S. patent laws (Title 35 U.S. Code) and the regulations of the U.S. Patent and Trademark Office (PTO) and the Patent Cooperation Treaty (PCT). **NOTE: The deadline for filing the formal patent application is March 1, 2018.**

3.0. CONTRACTOR TASKS

The contractor shall provide an itemized quote for each of the Statement of Work (SOW) tasks 3.1.1 through 3.1.9, keeping in mind that the quote for the formal drawings in item 3.1.7 is a pass through cost. For PTO fees in task 3.1.9, the contractor is to provide an estimate, and state whether an additional claim fee will be anticipated.

3.1. PATENT APPLICATION

The contractor shall submit a draft patent application to the EPA Patent Attorneys and EPA inventor for review prior to preparation of final documents. The EPA Patent Attorneys will authorize preparation of the final documents once the draft application is approved.

3.1.1. DRAFT APPLICATION

The contractor shall submit the draft application within two weeks of obligation. If for some reason this time frame cannot be met, the contractor shall immediately contact the EPA Patent Attorneys to determine a revised scheduled date. The EPA Patent Attorneys may authorize filing of the draft as a formal patent application, and a revised draft as a U.S. continuation-in-part application at a

later date.

3.1.2. FINAL APPLICATION

Once the EPA Patent Attorneys authorize the preparation of the final version of the U.S. patent application, the contractor shall prepare the final version within one week of the date that authorization was given. Copies of the final version of the patent application shall be forwarded concurrently to the inventor for execution and to the EPA Patent Attorneys.

3.1.2.1. POWER OF ATTORNEY

The Power of Attorney shall include Laura Scalise, Reg. No. 45,778 and Randall Cherry, Reg. No. 51,556 and may include any and all registered patent attorneys and patent agents of the contractor.

3.1.3. U.S. FILING

Upon execution of the final U.S. version by the inventor, the contractor shall receive said executed application and shall promptly file the application in the PTO. If instructed by the EPA Patent Attorneys, the contractor shall file unsigned copies of the patent application, and prepare the appropriate execution documents for late filing in accordance with PTO procedures. As indicated above, if instructed by the EPA Patent Attorneys, the contractor shall file the draft application as a formal U.S. application, with the understanding that the final version will be filed as a continuation-in-part application. Also, if instructed by the EPA Patent Attorneys, the executed U.S. application shall be transmitted to the EPA Patent Attorneys for filing.

3.1.4. PETITION TO MAKE SPECIAL

The contractor shall file with the formal U.S. application a 1.102(c) petition-to-make-special, citing utility of the invention for materially enhancing the quality of the environment. There is no filing fee for this petition.

See MPEP 708.02 § V at https://www.uspto.gov/web/offices/pac/mpep/s708.html

3.1.5. INFORMATION DISCLOSURE STATEMENT

The contractor shall prepare and file an Information Disclosure Statement once information regarding prior art is provided to or becomes known to the contractor. The Information Disclosure Statement must comply with PTO regulations.

3.1.6. ASSIGNMENT DOCUMENTS

The contractor shall prepare and forward an assignment document for execution by the inventor and shall file the executed assignment document in the PTO. EPA Patent Attorneys can provide a template if needed. The Assignee is the United States Government, as represented by the

Administrator of the U.S. EPA.

3.1.7. U.S. DRAWINGS

If the informal patent drawings provided by the EPA are likely to be unacceptable by the PTO and formal patent drawings are necessary, the contractor shall obtain approval from the EPA Patent Attorneys for this service. The EPA has established a not-to-exceed (NTE) amount for this line item. However, potential offerors should provide an estimate of drawing costs in their proposal. The contractor will only be reimbursed for the actual cost incurred and not the NTE amount. Should the actual cost exceed the NTE amount, the contractor should contact the EPA Patent Attorneys immediately, so that the purchase order can be modified.

3.1.8. OFFICIAL ACTIONS

The contractor shall include in the estimate an allowance for up to two hours of telephonic discussions and negotiations with the PTO and for preparation of routine documents—including, but not limited to, telephonic conversations about restriction requirements or Examiner's amendments, etc. The contractors shall advise the EPA Patent Attorneys of the unofficial PTO application serial number as soon as the contractor receives it. The contractor shall also forward a copy of official actions received from the PTO along with a copy of each item of cited prior art to the EPA Patent Attorneys. However, the contractor shall not prepare a response to the actions unless a subsequent task order for the work is issued by the EPA.

3.1.8.1. RESTRICTION REQUIREMENT

It is possible that the Examiner will issue an office action in the form of a restriction requirement. The contractor shall include in their estimate the cost for replying to a restriction requirement.

3.1.9. U.S. PTO FEES

The contractor shall pay the necessary filing fees subject to reimbursement by the EPA under this purchase order. The contractor will only be reimbursed for the actual cost incurred. Should the actual cost exceed the amount allowed in the purchase order, the contractor should contact the EPA Patent Attorneys immediately so that the purchase order can be modified.

4.0. CONTINUED PROSECUTION AND PRESERVATION OF FILES

The contractor should be aware that the EPA reserves the right to continue prosecution on its own or by contracting with another law firm. Accordingly, the contractor shall maintain a complete file of work done and of correspondence with the PTO, and if directed by the EPA, return the files or transfer the files to another contractor at the first contractor's expense.

4.1. CONTINUED PROSECUTION

For each office action subsequent to any restriction requirement, the contractor shall forward the action along with a quote for responding to the office action to the EPA Patent Attorneys within a week of the mailing date on the action. The contractor shall not answer the office action until a task order for the work is received.

5.0. OPTIONAL TASKS

In the event that a restriction requirement is issued by the Examiner, then the subsequent divisional applications will be treated as contract options.

6.0. DELIVERABLES

The contractor should refer to EPA Case No. 801-17 in addition to its own file and docket numbers and any numbers provided by the PTO.

Forward all patent application documents and correspondence related to these cases to the EPA Patent Attorneys and EPA inventor, Anthony Zimmer, at the following addresses:

Via FedEx or other courier (not U.S. mail or U.S. express or U.S. priority mail):

Laura Scalise
Patent Attorney (2377A)
Office of General Counsel - General Law Office
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
William J. Clinton Building, Room 7426S
Washington, DC 20460

Via FedEx, other courier, or U.S. mail:

Anthony Zimmer
U.S. Environmental Protection Agency
Office of Research and Development
National Risk Management Research Laboratory
26 West Martin Luther King Drive, MC CHL
Cincinnati, OH 45268

6.1. CONTACT INFORMATION

Laura Scalise – Patent Attorney
phone: (202) 564-8303
email: scalise.laura@epa.gov

Anthony Zimmer – Inventor
phone: (513) 487-2426
email: zimmer.anthony@epa.gov

7.0. INVOICING

The contractor shall provide receipt(s) for all NTE line items along with the invoices to the Financial Management Division directed on the purchase order with copies to the EPA Patent Attorneys and inventor, Anthony Zimmer. Payment will not be made unless receipt(s) are provided.

7.1. INSTRUCTIONS FOR SUBMITTING INVOICES

Invoices shall be prepared containing the following information:

1. purchase order number
2. description of services furnished
3. period of performance
4. taxpayer ID number
5. amount due

A. Invoices shall be submitted via email to:

RTPReceiving@epa.gov

Provide the pdf file with the following naming convention and SUBJECT in email

SI_PO#_invoice#.pdf [Example: SI_EP08X00005_5335.pdf]

B. The FedEx/Commercial Courier address for invoices:

US EPA, RTP-Finance (Mail Drop D143-02)
4930 Page Road
Durham, NC 27703

C. For status of Invoice Payments, call the Financial Office's Customer Service number at (919) 541-0616.

8.0. ACCOMPANYING DOCUMENTS

1. Provisional application number 62/602,565 - filed April 28, 2017
2. Provisional application filing receipt

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
62/602,565	04/28/2017		260	801-17		

CONFIRMATION NO. 7054

FILING RECEIPT

26083
U.S. ENVIRONMENTAL PROTECTION AGENCY
FINANCE & OPERATIONS LAW OFFICE/OGC (2377A)
1200 PENNSYLVANIA AVENUE, NW
WASHINGTON, DC 20460

Date Mailed: 05/11/2017

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Anthony Todd Zimmer, Cincinnati, OH;

Applicant(s)

U.S. Environmental Protection Agency, Washington, DC;

Power of Attorney:
Laura Scalise--45778

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/11/2017
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 62/602,565**
Projected Publication Date: None, application is not eligible for pre-grant publication
Non-Publication Request: No
Early Publication Request: No
Title

Highly tunable fluorescent core-shell particles for environmental release simulation and tracking applications

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Doc Code: **TR.PROV**
Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)
Approved for use through 05/31/2015. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Anthony	Todd	Zimmer	Cincinnati	OH	US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. — Add

Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications
Attorney Docket Number (if applicable)	801-17

Correspondence Address

Direct all correspondence to (select one):

◉ The address corresponding to Customer Number	○ Firm or Individual Name
Customer Number	26083

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

○ No.

◉ Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

○ Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

U.S. Environmental Protection Agency

PTO/SB/16 (11-08)
Approved for use through 05/31/2015. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

Entity Status
Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29

- ○ Applicant asserts small entity status under 37 CFR 1.27
- ○ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ◉ No

Warning

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature				Date (YYYY-MM-DD)	2017-04-28
First Name	Laura	Last Name	Scalise	Registration Number (If appropriate)	45778

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Anthony	Todd	Zimmer	

Residence Information (Select One) ◉ US Residency ◯ Non US Residency ◯ Active US Military Service

City	Cincinnati	State/Province	OH	Country of Residence	US

Mailing Address of Inventor:

Address 1	6740 East Beechlands Drive		
Address 2			
City	Cincinnati	State/Province	OH
Postal Code	45237	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	26083		
Email Address	scalise.laura@epa.gov	Add Email	Remove Email
Email Address	cherry.randall@epa.gov	Add Email	Remove Email

Application Information:

Title of the Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications		
Attorney Docket Number	801-17	Small Entity Status Claimed	☐
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	26083		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

- (●) Assignee
- ( ) Legal Representative under 35 U.S.C. 117
- ( ) Joint Inventor
- ( ) Person to whom the inventor is obligated to assign.
- ( ) Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	U.S. Environmental Protection Agency		
Mailing Address Information For Applicant:			
Address 1	1200 Pennsylvania Ave., NW		
Address 2	Office of General Counsel (MC-2377A)		
City	Washington	**State/Province**	DC
Country	US	Postal Code	20460
Phone Number	2025648303	Fax Number	
Email Address	scalise.laura@epa.gov		

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	

Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	U.S. Environmental Protection Agency

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	1200 Pennsylvania Ave., NW		
Address 2	Office of General Counsel (MC-2377A)		
City	Washington	**State/Province**	DC
Country i	US	Postal Code	20460
Phone Number	2025648303	Fax Number	
Email Address	scalise.laura@epa.gov		

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	Laura Scalise			Date (YYYY-MM-DD)	2017-04-28
First Name	Laura	Last Name	Scalise	Registration Number	45778

Additional Signature may be generated within this form by selecting the Add button.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	801-17
	Application Number	
Title of Invention	Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracking Applications	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

U.S. ENVIRONMENTAL PROTECTION AGENCY
EMPLOYEE REPORT OF INVENTION
(Prepare in triplicate)

This report is an important legal document, and should be read carefully before filling in data. The report and memoranda or correspondence concerning it are to be considered as confidential documents. Where necessary, use additional sheets to complete entries, identify with specific item designations as indicated on this form, and attach.

FOR EPA OFFICE OF GENERAL COUNSEL USE
DATE DISCLOSURE RECEIVED
CASE NUMBER 801-17

Prepared

I. INVENTOR'S IDENTIFICATION (1). *(For more than two inventors attach information on additional sheet.)*

A. Full name *(including middle name or initial)*	Citizenship	B. Residence address
Zimmer, Anthony Todd (see attachment for additional inventors)	U.S.A.	6740 E. Beechlands Drive, Cincinnati, OH 45237
C. Complete name of organization *(i.e. the company, or educational institution, etc.)* Environmental Protection Agency, Office of Research and Development		D. Office address 26 W Martin Luther King Drive, MS-CHL, Cincinnati, OH 45268
E. Position or title Research Engineer		F. Official working place address Same as item D

INVENTOR'S IDENTIFICATION (2).

A. Full name *(including middle name or initial)*	Citizenship	B. Residence address
C. Complete name of organization *(i.e. the company, or educational institution, etc.)*		D. Office address
E. Position or title		F. Official working place address

II. IDENTIFICATION OF THE INVENTION

Title of the Invention *(Title should be brief but descriptive of the invention.)*
Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracing Applications

III. PROBABLE UTILIZATION OF THE INVENTION.

A. Give your opinion of the extent to which the invention may be used by this Agency, other Government agencies, and the public.

This core-shell material can be engineered both as a simulant (e.g., oil droplets) and tracer (e.g., forensic tracking of an environmental contaminant). Environmental media applications range from open water (e.g., oceans, rivers) to complex environmental media (e.g., soils/sediments) transport. Traditional oil simulants, such as coffee beans or peat moss, poorly mimic the surface behavior of an oil and offer no understanding of sub-surface transport. Traditional tracers, such as fluorescent dyes used in water studies are problematic because it is rapidly diluted in water, has low adsorption rates and is readily degraded with sun exposure. This core-shell material offers many advantages as a simulant and tracer including: (1) tunable particle size/density/surface behavior to mimic the transport environmental contaminants (e.g., oil simulant for emergency response), (2) tunable surface to promote a variety of desired behaviors (e.g., stick together to mimic an oil slick or repeal one another or environmental media such as a soil), and (3) produce core-shell particles with physical diameters ranging from nanometers to micrometers.

B. Discuss briefly the Government's interest, if any, in further developing the invention.

Given the current lack of understanding of transport of contaminants (e.g., oils released from the Deepwater Horizon spill, fracking fluid transported within the earth), a tunable simulant and/or tracer technology is needed to understand environmental contamination. The government benefit is to

prevent/minimize/attenuate the environmental, economic and social costs associated with current and future contaminant releases.

IV. DETAILED TECHNICAL DESCRIPTION OF THE INVENTION. *(This description should be concise and include the following.)*

A. The principal utility and the general field of application of the invention.

An invention has been developed that involves aerosol synthesis of fluorescent core-shell particles that can be "tuned" for a wide variety of environmental applications ranging from contaminant simulation (e.g., oil droplets in open waters) to tracers (e.g., transport of hydrofracking fluids within geologic subsurface media). The critical advantages of this aerosol synthesis process in producing tailored core-shell materials include:

- Efficient, high production volumes. Aerosol synthesis processes produce the vast bulk of commercial materials that we use on a daily basis (e.g., carbon black, fumed silica). Several advantages of this process include continuous operation as well as inherent scalability (e.g., using 100 spray nozzles instead of one).
- Highly monodisperse core-shell particles. The core-shell synthesis process uses electrosprays that are desired for their inherent ability to produce uniform particle sizes. Uniform (i.e., monodisperse) particles provide very tight control in tailoring the synthesis process for the desired environmental application.
- Production of core-shell particles that can be specifically tuned to produce particle sizes ranging from nanometer to micrometer particle sizes. As an example, a nanometer-scaled, core-shell particles could be produced whose quantum light emissions are significantly higher than that predicted by individual molecules. In other words, this process could produce environmentally benign "quantum dots" that could be used as a tracer having detection limits <1 parts per billion concentrations.
- Tailoring of the fluorescent core to meet the environmental application requirements. For example, selecting fluorescein as an oil simulant in an open water response exercise would allow responders to clearly see the simulant without being masked by other interfering materials in the water such as human/plant organics.
- Tailoring the semitransparent shell material to meet environmental detection requirements. As an example, a thick carnauba plant wax (specific gravity less than water) could be combined with fluorescein to produce a simulant that floats on the water surface.
- Functionalizing the surface of the core-shell particles to produce desired particle-particle and particle-media (e.g., soil) behavior. As an example, the surface of the particles could charged such that the particles do not agglomerate and behave as single, discrete particles.
- Environmental degradation of the core-shell materials. As an example, fluorescein core-carnauba wax shell particles serve their environmental detection purpose and will naturally degrade in the environment (e.g., biodegradation of shell by wax-degrading bacteria and photolysis of fluorescein with sun exposure).

B. Briefly, what prompted the making of the invention, or how was the idea therefor obtained?

Given my extensive research experience in aerosol physics, Dr. Albert Venosa, an internationally recognized oil spill researcher for the EPA (now retired), approached me to ask if I could use my knowledge to develop an "oil simulant" due to the environmental communities lack of scientific understanding of the oil transport associated with the Deep Water Horizon spill. I told him that I could produce a simulant using aerosol physics to create a tunable fluorescent core and semi-transparent shell material. Drs. Al Venosa, Robyn Comny and I wrote up a proposal for creating an oil simulant that was issued by the Department of Interior, Bureau of Safety and Environmental Enforcement (BSEE). Our proposal was approved as an interagency agreement. We received funding ($320K) to investigate the proof of concept (September 2013).

An experimental apparatus was designed hat successfully proved the concept with a wide range of experimental results based primarily upon an aerosol generation technique known as electro-spraying. The initial experimental results were nanometer-scaled with particle sizes ranging from 20 to 60 nanometers (e.g., material would not float or sink, but given their small size would be transported with the surrounding fluid. These initial results also led to the idea of producing a material that could also be used as an environmental tracer rather than an environmental simulant. The success of this initial research led to second round of funding to improve the synthesis process ($175K, September 2015).

C. Previously known or used methods, materials, or devices performing the task or function of the invention, and the disadvantages of such prior art. In this connection discuss the particular problems encountered with the prior art. List all pertinent literature references and patents of which the inventor has knowledge.

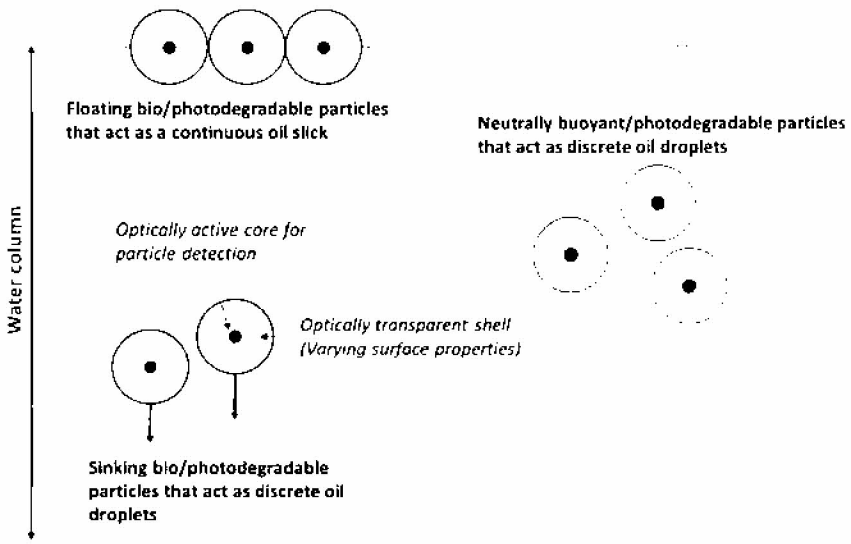
Traditional environmental simulants, such as an oil simulant, use materials such as coffee beans or peat moss. These simulant materials poorly mimic surface behavior and offer no understanding of the sub-surface transport of an oil droplet. Additionally, traditional tracers, such as fluorescent dyes used in water studies are problematic because it is rapidly diluted in water, has low adsorption rates and is readily degraded with sun exposure. This core-shell material offers many advantages as a simulant and tracer including: (1) tunable particle size/density/surface behavior to mimic the transport environmental contaminants (e.g. oil simulant for emergency response), (2) tunable surface to promote a variety of desired behaviors (e.g, stick together to mimic an oil slick or repeal one another or environmental media such as a soil), and (3) produce core-shell particles with physical diameters ranging from nanometers to micrometers (see Section A for additional information). Two distinctly different synthesis methods used in the creation of the core-shell material.

The synthesis method involves two fundamental steps in forming a monodisperse florescent core – semitransparent shell. The first step the formation of the fluorescent core particles using an aerosol generation technique known as electrospray. Electrosprays have been used in a wide range of commercial applications ranging from mass spectroscopy to electrohydrodynamic printing (Merrill MH, Pogue WR., Baucom JN (2015)). The dried core particles from the electrospray then flow into a furnace containing shell material (e.g. wax) vapors. At the exit of the furnace, the temperature markedly decreases resulting condensational growth of the vapor onto the core particles resulting in core-shell particles. Core-shell particles have been produced in the literature primary through solution-based techniques (Chaudhuri RG., Paria S (2011). However, this appears to be the first instance involving the use of an aerosol-based technique to produce core-shell particles for environmental simulation and tracer applications.

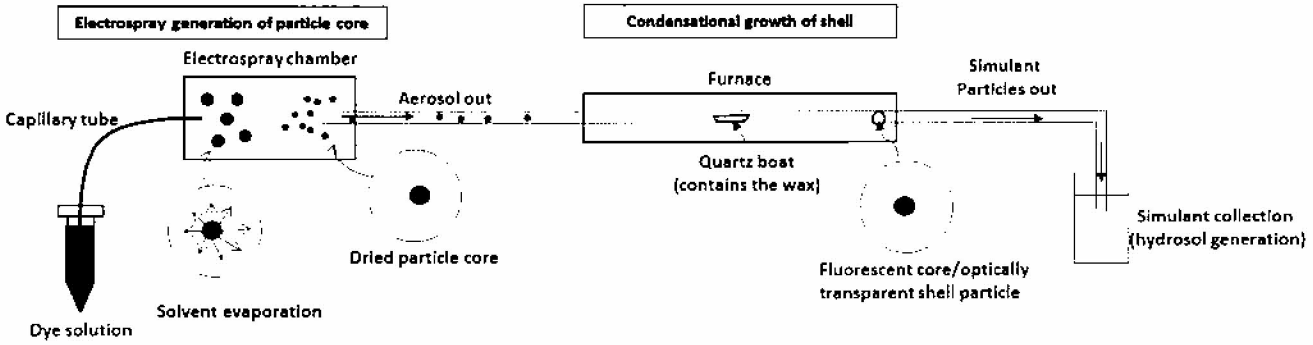
D. Respond to this part on separate sheets as enclosures to be attached hereto.

Give explanation of a specific embodiment of the invention:

1. Include therein the theory of the operation of the invention. The key is producing an environmental simulant or tracer that can be "tuned" for the environmental applications such that it can be: (1) readily detected in both concentrated and dilute conditions, (2) environmentally degradable to minimize long-term fate in the environment, and (3) mimicking, as closely as possible, the necessary transport properties in the environment. Please note that the following figure used oil as an example although the concepts can be applicable to other environmental contaminants as well as its use as a tracer.



2. In a mechanical or electrical invention give a detailed description by reference to a sketch or drawing. All component parts of the apparatus must be labeled and the description keyed thereto. The synthesis of this simulant particle, which is made of a fluorescent core and a optically transparent shell, is a multi-step process (see Figure 2) that involves: (1) electrospray generation of particle core, (2) condensational growth of the shell, (3) functionalization of the particle - potential next step, allowing additional tailoring of the particles, (4) collection and the storage of the simulant particles for subsequent measurement of crude oil simulant (e.g., hydrosol) via laboratory and field instrumentation.



3. In a process or chemical composition, include the extreme and preferred ranges of conditions *(e.g., temperature, pressure, ratio of components, voltage, current, etc.)* And alternate or equivalent materials which may be employed. Please note the attached manuscript that has undergone internal EPA review for submission to the Journal of Environmental Science and Technology. This document provides the apparatus and operational conditions for this invention.

4. Include any additional material such as photographs, reports, publications, and refer to texts or other informational material which may be helpful to an understanding of the invention. Please note the attached manuscript that has undergone internal EPA review for submission to the Journal of Environmental Science and Technology. This document provides detailed experimental results and discussion that proves the efficacy of this invention.

E. Alternate embodiments of the invention including specific examples. To the extent found to be appropriate, follow the instructions given in regard to D above.

F. The advantages of the invention over the prior art noted in connection with Item C. In addition to the information detailing the inherent disadvantages of the current environmental simulant/tracer technologies currently in existence (see Item C), this invention involves the aerosol synthesis of fluorescent core-semitransparent shell particles that can be "tuned" for a wide variety of environmental applications ranging from contaminant simulation (e.g., oil droplets in open waters) to tracers (e.g., transport of hydrofracking fluids within geologic subsurface media). The critical advantages of this aerosol synthesis process in producing tailored core-shell materials include:

- Efficient, high production volumes. Aerosol synthesis processes produce the vast bulk of commercial materials that we use on a daily basis (e.g., carbon black, fumed silica). Several advantages of this process include continuous operation as well as inherent scalability (e.g., using 100 spray nozzles instead of one).
- Highly monodisperse core-shell particles. The core-shell synthesis process uses electrosprays that are desired for their inherent ability to produce uniform particle sizes. Uniform (i.e., monodisperse) particles provide very tight control in tailoring the synthesis process for the desired environmental application.

- Production of core-shell particles that can be specifically tuned to produce particle sizes ranging from nanometer to micrometer particle sizes. As an example, a nanometer-scaled, core-shell particles could be produced whose quantum light emissions are significantly higher than that predicted by individual molecules. In other words, this process could produce environmentally benign "quantum dots" that could be used as a tracer having detection limits <1 parts per billion concentrations.
- Tailoring of the fluorescent core to meet the environmental application requirements. For example, selecting fluorescein as an oil simulant in an open water response exercise would allow responders to clearly see the simulant without being masked by other interfering materials in the water such as human/plant organics.
- Tailoring the semitransparent shell material to meet environmental detection requirements. As an example, a thick carnauba plant wax (specific gravity less than water) could be combined with fluorescein to produce a simulant that floats on the water surface.
- Functionalizing the surface of the core-shell particles to produce desired particle-particle and particle-media (e.g., soil) behavior. As an example, the surface of the particles could be charged such that the particles do not agglomerate and behave as single, discrete particles.
- Environmental degradation of the core-shell materials. As an example, fluorescein core-carnauba wax shell particles serve their environmental detection purpose and will naturally degrade in the environment (e.g., biodegradation of shell by wax-degrading bacteria and photolysis of fluorescein with sun exposure).

G. Features of the invention believed to be new. Using tunable, fluorescent core – semitransparent shell particles using aerosol synthesis processes appears to be a unique and new idea as an environmental simulant and/or environmental tracer.

H. If this is believed to be a joint invention, the contribution of each inventor.

- Dr. Anthony Zimmer (EPA employee) – Conceptualization of the idea, both as an environmental simulant as well as an environmental tracer; designed and constructed the experimental apparatus to test the proof of concept; developed the experiments needed to validate the proof of concept for creating tunable core-shell particles using aerosol synthesis processes.
- Dr. Albert Venosa (EPA retired) – Dr. Venosa approached Dr. Anthony Zimmer with a Department of Interior, Bureau of Safety and Environmental Enforcement Request for Proposal on oil simulant research. Dr. Venosa asked Dr. Zimmer if he could use his aerosol physics knowledge to produce an environmental simulant.
- Ms. Wenwen Yang (Pegasus contractor) – Ms. Yang conducted the bulk of the aerosol phase experiments to confirm both the efficacy and operating parameters of the synthesis process. She also conducted the initial hydrosol experiments to determine the behavior of the core-shell material in various water solutions.
- Dr. Robyn Conmy (EPA employee) – Dr. Conmy conducted the bulk of the hydrosol experiments to determine the performance of the core-shell material using both laboratory and field detection instruments.

Attached hereto and comprising a part of this disclosure are _____ supplemental pages.

CERTIFICATION OF INVENTOR(S)

I certify that the invention disclosed herein is the sole joint invention of the undersigned and that above statements and answers are true to the best knowledge and belief of the undersigned

Date	Signature
Date	Signature
Date	Signature

CERTIFICATION OF WITNESS(ES)

I certify that the invention described herein has been read and is understood by me

Date	Signature	Post office Address
Date	Signature	Post Office Address

V. SUMMARY RECORD OF THE INVENTION

Provide only the information requested. Do not submit records to which reference is made.

The making of an invention generally involves a conception or discovery followed by a series of acts which establish its correctness or operativeness. Depending upon the nature of the invention, these acts may involve any one or all of the following: The making of sketches, drawings, written descriptions; the making and testing of a model; the carrying out of a process; or the production of a composition of matter.

A. CONCEPTION

Conception is evidenced when the essential elements of the invention in its operable and practiceable form are fully disclosed to another in such manner that the invention could be produced or practiced from them without the exercise of further inventive skill by a person who is skilled in the field to which the invention relates. The disclosure may be oral, or written, including sketches or drawings.

1. (a) Earliest date and the place where conception of the invention was made. Exact date that Dr. Anthony Zimmer came up with the core-shell idea is unknown although the timeframe was April 2013. Given my extensive research experience in aerosol physics, Dr. Albert Venosa, an internationally recognized oil spill researcher for the EPA (now retired), approached me to ask if I could use my knowledge to develop an "oil simulant" due to the environmental communities

lack of scientific understanding of the oil transport associated with the Deep Water Horizon spill. I told him that I could produce a simulant using aerosol physics to create a tunable fluorescent core and semi-transparent shell material. On June 17, 2013, Drs. Anthony Zimmer, Al Venosa, Robyn Conmy submitted a proposal entitled, "Environmentally Benign Oil Simulants to Mimic the Behavior of Oil Droplets in the Ocean" to the Department of Interior, Bureau of Safety and Environmental Enforcement (BSEE) Request for Proposal for Oil Simulants.

(b) Earliest date and place this conception was related to others. On June 17, 2013, Drs. Anthony Zimmer, Al Venosa, Robyn Conmy submitted a proposal entitled, "Environmentally Benign Oil Simulants to Mimic the Behavior of Oil Droplets in the Ocean" to the Department of Interior, BSEE Request for Proposal for Oil Simulants.

(c) Persons to whom disclosure of conception was made. Drs. Venosa and Conmy had worked on many previous successful oil research proposals. They worked with Dr. Zimmer to submit a full research proposal to Department of the Interior, Bureau of Safety and Environmental Enforcement on June 17, 2013. The proposal was received by BSEE and was disclosed to federal employees who reviewed the proposal (e.g., contracting officer, contracting officer representatives, reviewing officials).

2. Date and place of making the first sketch or drawing. On June 17, 2013, Drs. Anthony Zimmer, Al Venosa, Robyn Conmy submitted a proposal entitled, "Environmentally Benign Oil Simulants to Mimic the Behavior of Oil Droplets in the Ocean" to the Department of Interior, BSEE. The conception and aerosol synthesis methods are illustrated by figures 1 and 2, respectively.

Present location of the first sketch or drawing, and identifying data for them *(i.e., page number in a specified workbook)*. See above for the BSEE proposal. The conception and aerosol synthesis methods are illustrated by figures 1 and 2, respectively. These figures are located on page numbers 5 and 7.

3. Date and place of making the first written description. See V1 through V2 above.

Present location of such description and identifying data for them *(i.e., page number in a specified notebook)* See V.1. through V.2. above.

B. REDUCTION TO PRACTICE

Reduction to practice occurs when a full scale working model or a prototype of the invention is made and operated as planned, or if the invention is a process, the process was tried out successfully, or if the invention is a composition of matter, the composition is actually produced.

1. (a) Date and place the first model or full size device was made, or process was first practiced or composition made. The first successful experiments of the fluorescent core – semitransparent shell was conducted on July 10, 2014 at the Center Hill Research Laboratory, 5995 Center Hill Avenue, Cincinnati, OH 45224 (Laboratory Notebook CH-298, Center Hill Laboratory Room 104).

(b) Identification of persons and/or records substantiating the facts indicated. A laboratory logbook at the Center Hill Research Laboratory, 5995 Center Hill Avenue, Cincinnati, OH 45224 substantiates both the experimental apparatus and initial experimental results. Both Dr. Anthony Zimmer and Ms. Wenwen Yang performed and were witnesses to the successful invention results.

2. (a) Date and place of the first successful operation or test of model, device, or process or composition. See above (B.1.(a) through B.1.(b).)

(b) Identification of persons and/or records substantiating the facts indicated. See above (B.1.(a) through B.1.(b).)

C. List other workbook entries, photographs, reports, correspondence, drawings, etc., that might have a bearing on supporting the conception and reduction to practice. The apparatus description, operational conditions, experiments that validate the core-shell synthesis process was fully documented in the attached manuscript. This manuscript has undergone internal EPA review for submission to the Journal of Environmental Science and Technology. This manuscript has yet to be submitted to the journal.

D. If the invention was disclosed to persons outside of the Agency identify the individuals, the companies or activities they represent, and the dates of such disclosures.

The invention and experimental results validating the fluorescent core – semitransparent shell synthesis process was presented in an interagency briefing on ____. The government agencies included: EPA, DOI and DOD. Members present were federal employees who were informed that a patent was being submitted on this research.

E. List with date, title or other identification, and place the first known or contemplated *(1)* public use, *(2)* publication, or *(3)* oral presentation of the invention. "Public use" here means the use or practice of an invention for its intended purpose, after testing or experimentation has shown that a workable form has been achieved, under conditions where the invention might have been observed by a member of the public under no injunction of secrecy, or where the practical results of the invention have been made available to the public.

(1) Public use

(2) Publication. The apparatus description, operational conditions, experiments that validate the core-shell synthesis process was fully documented in the attached

manuscript. This manuscript has undergone internal EPA review for submission to the Journal of Environmental Science and Technology. This manuscript has yet to be submitted to the journal.

(3) Oral presentation

VI. RIGHTS TO THE INVENTION

Introduction

A. Determination of rights:

Under Executive Order 10096, January 23, 1950, as amended by Executive Order 10930, March 24, 1961, whenever an invention is made by an employee of the Environmental Protection Agency, the employee may request a determination of the rights in the invention as between the Government and the inventor. There are three ways in which rights may be allocated: *(1)* the inventor may be entitled to all rights and the Government to none (in which event the inventor is not required to grant any rights to the Government); *(2)* the Government may be entitled to a license permitting it to practice the invention and the inventor entitled to all commercial rights (in which event the inventor is required to grant a license to the Government); *(3)* the Government may be entitled to all rights and the inventor to none (in which event the Inventor is required to assign the Invention to the Government).

B: Foreign filing:

Where the Government is entitled to all domestic rights in an invention it also acquired an option to secure foreign protection. The inventor will obtain the right to file in foreign countries if the Government determines not to exercise this option to file abroad, or permits the option to lapse as regards any foreign country by not filing or otherwise seeking protection of the invention within 6 months from the time a domestic application on the invention is filed.

C. Patent application filed by Government where inventor retains title:

Separate and distinct from the determination of rights, and even though it may appear that the inventor is entitled to all rights in the invention, the inventor may agree to license the Government to practice the invention in return for which the Government will prosecute an application for a patent on the invention at no expense to the inventor, provided the Government is sufficiently interested in the invention.

DESIGNATION BY INVENTOR IN RESPECT TO RIGHTS IN THE INVENTION

After carefully studying Note 1 below, the inventor should review the matter of his rights in the invention and indicate his wishes therein by selecting one of the options (1), (2), or (3), which follow.

(1) If the inventor is willing to voluntarily assign all rights *(foreign and domestic)* in the invention to the Government, he should place his signature, as indicated, after the following statement:

I am *(We are)* willing to assign to the United States Government the entire rights, title, and interest in and to the above-identified and described invention.

Date Signature(s) of the Inventor(s)

(2) If the inventor is willing to assign to the Government the domestic rights only, and desires to retain foreign rights, he should place his signature as indicated, after the following statement:

I am *(We are)* willing to assign to the United States the entire domestic rights, title, and interest in and to the above-identified and described invention, and wish to retain the foreign rights thereto.

Date Signature(s) of the Inventor(s)

(3) If the inventor is not willing to voluntarily assign at least all domestic rights in the invention to the Government, a determination of rights will be made as provided for in the orders and regulations identified above upon consideration of the information provided by the Invention Rights Questionnaire *(EPA Form 3340-2)* attached hereto. Please check and sign below.

☐ A completed Invention Rights Questionnaire *(EPA Form 3340-2)* is submitted herewith and a request for this determination is hereby made.

In the event the inventor retains title pursuant to such determination, the Government may file a patent application on the invention at its own expense for the inventor at his request if he agrees to grant the Government a royalty-free license to practice the invention for all governmental purposes, as explained in paragraph C above. Please check and sign below.

☐ I (We) request the Government to file under the conditions specified above.

Date Signature(s) of the Inventor(s)

Note 1. Executive Order 10096, as amended by Executive Order 10930, provides that each Government agency shall determine, at the request of the employee-inventor, the respective rights of the Government and the employee in his invention.

The Executive Order sets forth criteria to be applied in making the determination of rights in the invention. Under these criteria the entire rights are obtained by the Government if the invention was made (a) during the employee's working hours, or (b) with a contribution by the Government of facilities, equipment, materials, funds, or information, or time or services of other Government employees on official duty, or (c) if the invention bears a direct relation to or is made in consequence of the official duties of the inventor. When the Government's contributions, as measured by the aforementioned criteria, are insufficient equitably to justify requiring the entire rights to go to the Government, or the Government has insufficient interest in the invention to obtain the entire rights *(although it is entitled to the entire rights)*, the Agency, subject to the approval of the Commissioner of Patents in the Patent Office, is authorized to leave the title to the invention in the employee, subject to a reservation to the Government of an irrevocable, royalty-free license to the invention with power to grant sublicenses for all governmental purposes.

In applying the Executive Order there is a presumption that the invention belongs to the Government if the employee-inventor is assigned to invent or improve anything, to conduct or perform research or development work or both, to supervise, direct, coordinate, or review Government-sponsored research, development work, or both, or acts in a liaison capacity among Government or nongovernmental parties engaged in such work. When the work of the employee-inventor does not involve making inventions or improvements, research or development work, or both, as explained above, there is a presumption that title to the invention remains with the employee-inventor, and the Government is entitled to only a suitable license in the invention. However, the Executive Order also allows either presumption to be rebutted by a showing of the facts and circumstances in the case, and a determination that these facts and circumstances justify leaving the entire rights to the invention in the employee-inventor, subject to law. In any case where the Government neither obtains the entire domestic rights, nor reserves a license, the Agency, subject to the approval of the Commissioner of Patents, is authorized to leave the entire rights to the invention in the employee-inventor, subject to law.

The Executive Order also provides for a procedure whereby any employee aggrieved by a determination of the Agency, may obtain a review of the determination by filing within 30 days after receiving notice of such determination, two copies of an appeal with the Commissioner of Patents. On a timely request by the employee appealing the Agency's determination, an oral hearing in the matter will be granted by the Commissioner of Patents. After the expiration of a time set for a reconsideration of the decision of the Commissioner of Patents, the decision becomes final.

EPA Case 801-17

Invention: Highly Tunable Fluorescent Core-Shell Particles for Environmental Release Simulation and Tracing Applications

Inventor: Anthony Todd Zimmer

I Claim:

1. A particle comprised of a fluorescent core and an optically transparent shell produced using aerosol synthesis to create the core and condensation to create the shell.

2. The particle of claim 1 wherein its properties are tunable to be floating, sinking or neutrally buoyant.

3. The particle of claim 1, wherein it is biodegradable.

4. A method using fluorescent core/optically transparent particles for tracing pollutants in a water environment.

5. A method using fluorescent core/optically transparent particles for simulation of contaminant release into a water environment.