CPSC-I-12-0014
INTERAGENCY AGREEMENT
BETWEEN THE
U.S. CONSUMER PRODUCT SAFETY COMMISSION (CPSC)
AND THE
NATIONAL SCIENCE FOUNDATION (NSF)

1. PARTIES AND PURPOSE

This Interagency Agreement (IAG) establishes an agreement between the CPSC and the National Science Foundation (NSF), through which CPSC will provide funds to NSF in support of an investigation to develop innovative tools for measuring the potential health impact of nanotechnologies used in clothing and textile-based consumer products and develop risk models for human exposure to materials released from these consumer products.

Title: Consumer Exposure to Airborne Nanoparticles Released from Nanotechnology-enabled Clothing

2. BACKGROUND

Nanotechnologies are used in globally sold consumer products (e.g., electronic computer housing, soft furnishings, and cosmetic products) to meet the market's and consumer's performance and cost requirements. The number of nanotechnology-enabled consumer products keeps expanding and there is a growing concern regarding the release and human exposure to nanoparticles and adverse health effects associated with the use of such products. This project will provide answers regarding the extent of such exposures due to the nanotechnology-enabled clothing. The findings of this study and exposure assessment will be applicable to a large segment of the entire population. The results can also be used to design health studies assessing health risks due to the nanoparticles and nanotechnology-enabled products in general commerce and manufacturing.

3. AUTHORITY (See Form 1611)

4. TERMS AND CONDITIONS

(A) CPSC will transfer $299,773 to NSF as reimbursement for the activities contemplated by this agreement. This transfer will be made in advance.

(B) Work to be undertaken and deliverables to be provided:
The following aims and objectives will be completed by NSF: CPSC recognizes that there is a 6.51% cost recovery for NSF. These costs are used to cover a number of costs

DFM Control No. L207
NSF OA No. 12301

NSF Statutory Authority. This agreement is entered into pursuant to the authority of the National Science Foundation Act of 1950, as amended (42 USC 1861-75).

including the support of expert reviews. This expert review ensures that the work represents the highest quality science available.

Hypotheses. The main goal of the project will be achieved by investigating these hypotheses:

1) The wear of nanotechnology-enabled clothing results in higher inhalation exposures (inhaledand lung-deposited particle concentration, surface area and mass) and total emissions (total released particle concentration, surface area and mass) of airborne nanoparticles and their agglomerates compared to similar products that are not nanotechnology-enabled.

2) The "wear and tear" of the clothing items which incorporate engineered nanomaterials result in the increased inhalation exposure and total emissions of airborne nanoparticles and their agglomerates compared to brand-new products.

3) Intensity of consumer exposure (inhaled and lung-deposited particle concentration, surface area and mass) due to the use of nanotechnology-enabled clothing depends on the product brand.

The hypotheses will be tested through the following Specific Aims:

1) **Characterization of nanomaterials incorporated into nanotechnology-enabled clothing.**This information is required to verify that the presence of nanomaterials in the products to be tested is real and not just a marketing claim. Furthermore, since the biological effects of nanomaterials are greatly influenced by their physical properties such as composition, size, surface charge and chemistry, detailed information about these characteristics would be required in order to test the hypotheses. The size, shape, morphology and density of nanoparticles incorporated into the fabrics will be determined using scanning electron microscopy (SEM) and high-resolution transmission electron microscopy (HR-TEM). The composition and hence the chemical properties of the particles would be determined using several techniques including atomic emission spectroscopy (AES) and X-ray Fluorescence spectroscopy (XRF).

2) **Investigation of the nanoparticle release from clothing.** The personal exposure and the total emissions of airborne nanomaterials released from the nanotechnology-enabled clothing will be measured in the well-characterized Controlled Environment Facility (CEF) using "running" and "walking" robotic mannequins. Innovative use of robotics will increase reproducibility of the exposure data and will not require human subjects. The personal exposures and total emissions from clothing at different states of "wear and tear" will be estimated in terms of inhaled and released particle size distribution parameters,concentration, and lung-deposited surface area. The exposures and particle release from nanotechnology-enabled products will be compared to the

release from products that perform similar functions but are not nanotechnology-enabled.

3) The properties of airborne nanoparticles released from clothing during their wear will be investigated by collecting those airborne particles and analyzing them using the same techniques as described in Specific Aim 1. This information will be linked with airborne particle size characteristics to provide a more accurate estimate of the concentration, mass and surface area of particles challenging the respiratory system. We will also determine whether the released particles are actually engineered nanoparticles that were incorporated into the product or they are part of the product matrix.

4) **Determination of respiratory deposition due to the exposure to nanomaterials released from clothing.** The concentration, surface area, volume and mass of particles deposited in the lung will be estimated using measured particle characteristics and an established particle deposition model (ICRP, 1994) for head, throat and larynx, bronchi, bronchioles, and alveoli.

Investigation Approach

The main goal of this research is to investigate the release and inhalation exposures to airborne nanoparticles and their agglomerates due to the use of nanotechnology-enabled clothing and to quantify these exposures in terms of inhaled and lung-deposited particle size, concentration, surface area and mass as well as to determine changes in exposure over a prolonged product use.

a) Consumer Products to be investigated

Presently, there are dozens of clothing items that directly or indirectly use nanotechnology and it would be impossible to test exposures to all of them. We selected several typical clothing products from different manufacturers that use nanotechnology-enabled materials to improvetheir performance, e.g., stain resistance, durability, longevity, etc.

2. Similar products, preferably from the same manufacturers that do not claim to be nanotechnology-enabled.

Experimental Procedures

Specific Aim 1. Characterization of nanomaterials incorporated into fabrics. We will perform source characterization of the raw materials (if available) as well as of the clothing items to verify the presence of nanoparticles in the selected consumer products. We will analyze the size, shape, morphology, density and other properties of engineered nanomaterials within the products and, to the extent possible, their chemical composition. These tests are critical in determining the expected primary particle size of the claimed nanomaterials and whether the source of aerosolized particles is the engineered nanomaterials deliberately introduced into the product or they are a part of the product's holding matrix. In addition, these characteristics would be important in understanding any possible biological effects from the release or inhalation exposures to airborne

nanoparticles stemming from the consumer clothing incorporating these nanomaterials, The samples of raw materials (if available) as well as samples of clothing will be analyzed for particle size and morphology using scanning electron microscopy (SEM), highresolution transmission electron microscopy (HR-TEM and atomic force microscopy (AFM). The use of highly sensitive techniques such as atomic emission spectroscopy (AES) and X-ray Fluorescence (XRF) would provide detailed information on the elemental composition of these engineered nanomaterials. This effort will be lead by Dr. Lee, who has extensive experience in the synthesis of various nanomaterials and their subsequent characterization using these techniques. The access to the equipment is available through the core facilities at Rutgers University.

CPSC will provide funding to the NSF in the amount of $299,773. NSF agrees to provide an annual report which will provide an update of the progress of the project at the end of the fiscal year. The report will be due by September 28th of each fiscal year.

5. ACCOUNTING DATA (See Form 1611)

Tax Identification Number (TIN)
NSF: 53-0206152
CPSC: 520978750

Accounting Data:
CPSC: 0100A12DPS 2012 2370400000 EXHR004000 255A0: $299,773.00

6. DURATION OF AGREEMENT AND AMENDMENTS

This agreement will become effective when signed by the parties. The agreement may be amended at any time by mutual written consent of the parties.

Period of Performance: 7/01/2012 throough 09/30/2013

7. DISAGREEMENTS

In the event that CPSC and NSF have a disagreement arising under this interagency agreement, the parties shall cooperatively seek to resolve the disagreement by themselves. If the disagreement cannot be resolved between them, the parties agree to seek the assistance of a third party in resolving the disagreement.

8. CONTACTS (See Form 1611)

The parties agree that if there is a change regarding the information in this section, the party making the change will notify the other party in writing of such change.

FOR CPSC:

Donna Hutton
Contracting Officer
U.S. Consumer Product Safety Commission
Division of Procurement Services, Room 517
Bethesda, MD 20814
Telephone: (301) 504-7009
Fax: (301) 504-0628
Email: dhutton@cpsc.gov

Date: 8/8/2012

FOR NSF:

Kim Bub
Grants Officer
NSF
703-292-4331
Kbub@nsf.gov

Date: 8/20/12

CPSC-I-12-0014

FINANCIAL DATA for INTERAGENCY AGREEMENTS (Transfers TO NSF)

The Intragovernmental Business Rules issued November 30, 2010, under Treasury Financial Manual (TFM) Bulletin 2011-05 Volume I (http://www.fms.treas.gov/factsi/vol1/vol1appen10.doc) recommends use of the new standard Interagency Agreement (IAA) forms (Treasury Form 7600A/B) for all intragovernmental transactions that exchange goods and services. (Forms are found online at: http://www.fms.treas.gov/finstandard/forms.html) Page two of this NSF form, once completed by the NSF Program Official, provides the minimum data required from NSF as the Servicing Agency (seller) to complete the standard IAA forms.

If the Requesting Agency (buyer) does NOT use the new government-wide standard IAA form, then this NSF form (page one) must be filled out and signed by the Requesting Agency and provided to NSF (as Servicing Agency) as an attachment to any agency-specific funds transfer documents.

Requesting Agency ("buyer") Name/Office		U.S. Consumer Product Safety Commission	
Agency Location Code (ALC)		61-00-0001	
Treasury Agency and Trading Partner Code		61	
Business Event Type Code (BETC)		DISB (as requesting agency)	
Business Partner Network # (BPN or DUNS #)		069287522	
Treasury Account Symbol (TAS)		61120100	
Fiscal Year Funds Appropriated		2012	
Type of Funds (e.g., one-year, two-year, no-year)		One-year	
Fund Expiration Date:	09/30/2012	Fund Cancellation Date:	09/30/2012
Statutory Authority & Citation for entering into IAA		CPSA (15 U.S.C. 2076(g))	

Contact Information:	Name & Title	Email & Telephone Number
Agency/Program Official	Dr. Treye Thomas	tthomas@cpsc.gov (301) 504-7738
Grants/Contracts Officer (funds approving official)	Hai Duong, Deputy CFO	hduong@cpsc.gov (301) 504-7575
Finance Office (payment office)	CPSC Accounts Payable Branch AM-160; PO Box 25710 Oklahoma City, OK 73125 Debbie Young	Phone: (405) 954-7467

Please acknowledge that NSF's requirements as Servicing Agency (on page 2 of this form) have been addressed in any agency-specific IAA form.

Requesting Agency Official Completing Form	Name: Donna Hutton	CPSC Contracting Officer
	Date: 8/8/2012	(Signature) Donna Hutton

FINANCIAL DATA for INTERAGENCY AGREEMENTS (Transfers TO NSF)

Servicing Agency ("seller") Name	*National Science Foundation*	
Agency Location Code (ALC)	*49-00-0001*	
Treasury Agency and Trading Partner Code	*049*	
Business Event Type Code (BETC)	*COLL* (as servicing agency)	
Business Partner Network # (BPN or DUNS #)	*074811803*	
Treasury Account Symbol (TAS) *(NSF's Treasury Account Symbol varies depending on the program being supported – NSF Program Office must designate appropriate account to use)*	*FY 2012 TAS for ACR funds* *4920180 Agency Operations & Award Management* *FY 2012 TAS for Program Support* *4912/130100 Research & Related Activities*	
FY12 Administrative Recovery Rate	*6.51%* deducted from total funds transferred *	
Statutory Authority	*National Science Foundation Act of 1950, as amended (42 USC 1861-76)*	
Billing Information	*Reimbursement Basis; Seller Initiated IPAC; Billing on a monthly basis*	
NSF Requirements	*NSF will obligate Requesting Agency's funds within period of availability. NSF will bill and collect for ACR upon obligation of any portion of the funds and only bill for reimbursement for program support portion after expenditures are submitted by the grantee or contractor.* *The period of performance of the IAA must cover the entire anticipated period of the grant, cooperative agreement (CA), and/or contract, as appropriate, and any grant, CA, and/or contract will be awarded in accordance with NSF's terms and conditions.*	
Performance Period	*07/01/2012 – 09/30/2013*	
NSF Address	*4201 Wilson Boulevard, Arlington, VA 22230*	
NSF Agency Official	*John McGrath* *Division Director, ENG/CBET*	*jmcgrath@nsf.gov, 703.292.5382*
NSF Program Officer	*Barbara Kern* *Program Director, ENG/CBET*	*bkern@nsf.gov, 703.292.7949*
NSF Grants/Contracts Officer Contact Info (authorized official to accept funds for NSF)	*Kim Bub* *Team Lead, BFA/DGA*	*kbub@nsf.gov, 703.292.4331*
Finance Office (billing)	*Shanell Overton* *dfm-ipac@nsf.gov* *(703) 292-8359*	*NSF Division of Financial Management* *Accounting Operations Branch* *4201 Wilson Blvd, Room II-605* *Arlington, VA 22230*

* to calculate correct ACR amount as a percentage of the program support funds, divide the program support funds by 0.9349, which equals the total amount to be transferred (the difference between this calculated total and the program support funds is the exact ACR amount – MUST be rounded to nearest whole dollar)

L257

National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Internal Transmittal Memo for "Incoming" Interagency Agreements (IAAs)

Date:	8/16/12	
To:	☒ DGA ☐ DACS/Cooperative Support ☐ DACS/Contracts Branch	
From:	ENG/CBET	
Program Officer:	Barbara Karn	7949
Program Administrative POC:	Sherri Payne	7957
Subject: IAA from U.S. Consumer Product Safety Commission		
(insert requesting agency agreement or MIPR #)		

Total IAA Amount transferred to NSF:	$299,773.00
Less ACR (NSF admin fee) 6.51%	($19,515.22)
Available to Obligate on grant/contract:	$280,257.78

NSF Program Org Code	07020000	NSF Thematic Code	Disciplinary & Interdisciplinary Research

☒Yes ☐No Does the IAA identify specific NSF grants, cooperative agreements, or contracts to be supported by the other agency's funding?

If "yes", provide detailed information in the space below for each NSF proposal or contract to be funded with the subject IAA [attach detailed list for more than two proposals]. If no, skip to next question below.

NSF proposal or contract #:	1236508	
PI Name (first & last):	Gediminas Mainelis	
Awardee/Vendor name:	Rutgers University New Brunswick	
Amount to be Obligated (based on amount available calculated above):	$299,773	$

☐Yes ☐No If specific awards have not yet been identified, is there a signed Memorandum of Understanding (MOU) approved in accordance with NSF clearance procedures that explains the purpose of the funding and the responsibilities for NSF to use the funds?

If "yes", include a copy of the MOU with the IAA paperwork or provide a link to the document if accessible online.
[insert link to MOU if applicable]

If there is no MOU and no proposals have been identified above, then provide explanation of the plans to obligate the other agency's funds transferred by the IAA prior to fiscal year end.
[insert explanation]

5300019257
OA#12301

RECEIVED 8/16/12

"Incoming" IAA Checklist:

- ☒ Clearly stated project description or scope of work that identifies the specific activities to be supported by the IAA
- ☒ IAA performance period sufficiently covers proposed grant/contract period that will be obligated to perform work requested by other agency including time to bill for those expenses incurred by the grantee or contractor
- ☒ Acknowledgement of NSF's administrative cost recovery (ACR) rate to be deducted from the total transferred (be sure that NSF's fee amount based on total funds is calculated correctly)
- ☒ Financial Data for "Incoming" IAAs (NSF form 1611) has been completed by other Federal agency only if the IAA is not filled out using the Treasury Standard Forms 7600A & B
- ☒ Funds represented in whole dollars only (NSF cannot process acceptance of cents)
- ☒ Payment/Billing identified as "reimbursement" (Note: NSF typically does not request "advance" funds. If use of advance billing is requested, a justification must be obtained from the other agency on their requirement for advance billing for consideration by DFM and DGA/DACS.)
- ☒ IAA signed by appropriate Requesting Agency Official
- ☒ Program Office has reviewed any special clauses/requirements included in the IAA to ensure that nothing conflicts with NSF policies or procedures (consult with DGA/DACS)
- ☐ Copy of approved MOU (if applicable – can be made available electronically)

NSF Program Official Recommendation:

The subject IAA is herein recommended for acceptance and meets the guidelines and data requirements for incoming agreements. Any grants, cooperative agreements, or contracts, including supplements to existing awards, issued as a result of the subject IAA will be awarded in accordance with NSF policies and procedures. Monitoring of the executed agreement, timely provision of identified deliverables (where appropriate), and any requests for extension of the agreement to coincide with any approved extensions of the resultant grant/contract will be handled by the cognizant NSF program official.

8/9/12

Barbara Karn, Program Director (signature)

Printed Name/Title: