National Science Foundation
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Arlington, Virginia 22230

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Dear Colleague Letter: Sustainable Chemistry, Engineering, and Materials (SusChEM)

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The purpose of this Dear Colleague Letter (DCL) is to draw your attention to the opportunity for research and education in the chemical sciences and engineering related to sustainable synthesis, use, and reuse of chemicals and materials under the initiative of Sustainable Chemistry, Engineering, and Materials (SusChEM).

For FY 2013, the participating divisions are the Division of Chemistry (CHE); the Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET); and the Division of Materials Research (DMR). The Materials Processing and Manufacturing program in the Division of Civil, Mechanical and Manufacturing Innovation (CMMI) will also participate, and the Division of Earth Sciences (EAR) will collaborate on proposals with aspects relevant to the geosciences, such as harvesting of elements and geological processes pertinent to the development or fate of technological materials. The SusChEM initiative is expected to continue and additional divisions are expected to participate in FY 2014 and beyond.

SusChEM is a new emphasis area in the family of programs in the NSF-wide Science, Engineering and Education for Sustainability (SEES) initiative.[1] As with all SEES programs, SusChEM proposals must advance science, engineering, and education to inform societal actions aimed at environmental and economic sustainability. Proposals are expected to take a systems-based approach to understanding, predicting, and reacting to change. Through support for interdisciplinary research and education, the projects must facilitate the move to global sustainability. Formation of partnerships is strongly encouraged, as is inclusion of educational experiences to train a highly skilled workforce prepared to face complex challenges. The SusChEM initiative specifically addresses the interrelated challenges of sustainable supply chains, engineering, production, and environmentally benign use of chemicals and materials by design. Because of the expected complex nature of the proposals, co-review and co-funding among the partnering NSF units is anticipated.

Fundamental research topics of interest in SusChEM include replacement of rare, expensive, and/or toxic chemicals with earth-abundant, inexpensive, and benign chemicals; recycling of chemicals that cannot be replaced; development of non-petroleum based sources of important raw materials; discovery of new separation science that will facilitate recycling; and design of chemical processes to include recovering and recycling. Separation of critical metals, separation of gaseous byproducts from biomass conversion, water purification techniques, and chemical processes designed for zero waste are appropriate.

Another example of a suitable topic area is the development of materials for the preservation and extension of natural resources, for improved and extended operation or lifetime, to replace or substitute current materials for a safer and more secure future, or designed for zero waste. Sustainable materials processing is relevant, particularly processes with reduced use of toxic components, such as solvents, carbon emissions, and pollutants; processes under ambient conditions, as opposed to extreme temperatures, pressures or other harsh conditions; and increased conservation of natural resources, such as water, raw material, and energy.

Proposals should be submitted within the existing submission window of the relevant program and under a title that begins with 'SusChEM: '. Proposals are welcome from either multiple or single

investigators. Interdisciplinary and Collaborative proposals among Principal Investigators (PIs) are encouraged and should be submitted to the most relevant program in one division while identifying possible co-review programs in the other divisions (by listing the appropriate NSF units on the cover page). Other mechanisms, such as supplement requests to existing grants, EAGERs, or CREATIV[2] may be appropriate, but PIs are urged to check the divisional web-pages for additional guidance[3] and to consult with relevant program officers in advance of submission. While not required, ties with industry, national laboratories, or other organizations are encouraged. If there are strong collaborations with industry, the Grant Opportunities for Academic Liaison with Industry (GOALI)[4] solicitation can be used in conjunction with this effort. For single investigator proposals, the PI should request a budget and duration typical of the program to which the proposal is submitted. For proposals involving multiple investigators, a higher budget consistent with the scope of the proposed research will be considered.

We are excited by the opportunities in the SusChEM area and the contributions that our community will make to society's ability to address long-term needs.

Teofilo Abrajano
Division Director
Division of Earth Sciences

John J. McGrath
Division Director
Division of Chemical, Bioengineering, Environmental, and Transport Systems

Steven McKnight
Division Director
Division of Civil, Mechanical and Manufacturing Innovation

Matthew S. Platz
Division Director
Division of Chemistry

Ian Robertson
Division Director
Division of Materials Research

1. SEES: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707
2. CREATIV: http://www.nsf.gov/pubs/2012/nsf12011/nsf12011.jsp
3. CHE: http://www.nsf.gov/div/index.jsp?div=CHE; Tingyu Li: tli@nsf.gov

DMR: http://www.nsf.gov/div/index.jsp?div=DMR; Sean Liam Jones: sljones@nsf.gov
or Lynnette Madsen: lmadsen@nsf.gov
CBET: please contact Luke Achenie: lachenie@nsf.gov or Barbara P. Karn: bkarn@nsf.gov
EAR: please contact Deborah Aruguete: daruguet@nsf.gov
CMMI: please contact Mary Toney: mtoney@nsf.gov

4. GOALI: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12513