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NEBRASKA CENTER FOR MATERIALS AND NANOSCIENCE
2011 SEMINAR SERIES PRESENTS

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DR. CLARK V. COOPER

Director, Materials and Surface Engineering Program, National Science Foundation

Materials Research at NSF: An Overview of the Materials and Surface Engineering Program

The materials and surface engineering program at the National Science Foundation supports basic research that is intended to advance the state of knowledge and understanding, through discovery, of the interrelationships among composition, structure, and properties throughout the spectrum of length and time scales. It accepts proposals that are purely experimental, purely modeling/ simulation, purely theoretical, and combinations thereof. This presentation will include an overview of both NSF and the materials and surface engineering program, the review of a small number of example grants that represent the program, and will culminate with the identification and discussion of strategic future directions and objectives that the PD is likely to pursue, including research at the intersection of the life and physical sciences, the pervasive use of *ab initio* modeling as an instrument to promote discovery, and research opportunities in Mg and its alloys. It is hoped that the seminar presentation will assume an informal format that encourages interaction among the presenter and members of the audience in order to maximize the exchange of information that is most useful to the audience.

Clark V. Cooper is Director of the Materials and Surface Engineering program at the National Science Foundation, a position that he has held since February 2006. At NSF, he has been active in championing a new focus on Simulation-Based Engineering and Science, including leadership in the planning and execution of a two-continent study and a strategic directions workshop. Prior to his commencement at NSF in early 2006, he was a Principal Scientist at United Technologies Research Center in Connecticut, where he pursued fundamental and applied research in the general area of surface science and engineering, focusing on the use of various physical (PVD) and chemical (CVD) vapor deposition processes to synthesize hard and protective coatings and the application of thermo-chemical processes to improve the properties of the surfaces of engineering materials.

He and his colleagues have demonstrated the effectiveness of these and other surface modification techniques, including high intensity plasma ion processing (HIPIP), to impart remarkable improvements in hardness and wear and corrosion resistance of engineering alloys and in the surface and bending fatigue durability of power transmission gears. He and his collaborators demonstrated the successful application of first-principles modeling, especially at the atomistic level, to understand and design more effective additive compounds for synthetic lubricants and developed novel approaches to integrate length and time scales for innovative multi-scale models. In addition, he has contributed to advancements in the understanding and to improvements in the properties of materials and coatings for use at high temperature and in other extreme environments.

Friday, March 4, 2011
West Scott Engineering Center 237, 1:30 p.m.
UNL City Campus

Host:
Dr. Yongfeng Lu
Department of Electrical Engineering

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