

Contact: Jean Friedrich

IOWA STATE UNIVERSITY– EQUIPMENT PURCHASE

Action Requested: Consider approval of the equipment purchase of a Local Electrode Atom Probe (LEAP) microscope at an estimated cost of \$1,600,000.

Executive Summary: Iowa State University requests approval to proceed with the purchase of a Local Electrode Atom Probe (LEAP) microscope.

Description of Equipment

This purchase will provide a specialized microscope for the Departments of Chemical and Biological Engineering, Materials Science and Engineering, Mechanical Engineering, Chemistry, and the Institute for Combinatorial Discovery. The LEAP microscope would be used for three dimensional atom-scale compositional mapping of materials. Applications include high throughput analysis of atom-scale materials chemistry and characterization of low conductivity bio/organic materials.

The LEAP is a point projection microscope operating under high vacuum that defines 3D atom-scale structure of materials using field evaporation between a sample and local electrode, with a time of flight mass spectrometer used to accurately characterize chemical composition. The atom probe provides the highest spatial resolution of any microanalysis technique.

The instrument consists of the local electrode atom probe microscope, time of flight mass spectrometer, computer control console, and imaging and analytical software.

Justification of need for Equipment

The local electrode atom probe microscope (LEAP) is required to meet current and future research needs of several engineering and science departments at Iowa State University and the Institute for Combinatorial Discovery. The main focus of the research will be on designing innovative architectures for fuel cell catalysts, composition and microstructure of high performance alloys, organization and structure of molecular thin films, and detailed morphologies of novel degradable biomaterials. An instrument configured for this specialized application is currently not available at ISU. ISU would be only the third U.S. academic institution with a LEAP.

Any Known Alternatives to the Equipment Proposed

Few instruments exist that provide both high resolution spatial structure and compositional information. High resolution electron microscopes can provide direct images of atom-level structure, but lack the ability to produce three-dimensional images, perform high throughput sampling, or adequately deal with organic/biological materials. Atomic Force microscopes typically do not have atom level detail or 3 dimensional mapping capabilities. 3D transmission electron microscope systems typically do not have the rapid data gathering ability of the LEAP systems, nor the ability to readily perform compositional mapping.

The requirements for this procurement will be competitively bid under the formal bid process proscribed by Regent policy. Due to an estimated six months lead time involved with building this specialized instrument, the principal investigator requested the procurement and approval process begin as soon as possible. This will permit order placement shortly after the bids are received.

Estimated Cost and Source of Funding

The local electrode atom probe microscope will cost approximately \$1,600,000 and will be funded by a grant from the W.M. Keck Foundation.

Board Policy

Chapter 7.05B(12) of the Regent Policy Manual requires that:

- Equipment costing more than \$1,000,000 must be submitted to the Board for approval; and
- Requests submitted to the Board Office for approval must include the following information:
 - Description of the equipment;
 - Justification of the need for the equipment;
 - Any known alternatives to the equipment proposed; and
 - Estimated cost and source of funding.