CASE WESTERN RESERVE UNIVERSITY
CASE SCHOOL OF ENGINEERING

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RESEARCH AREAS AND APPLICATIONS

- Ceramic materials for electronic, magnetic, and optical applications
- Synthesis of ceramic thin films
- Point defect chemistry
- High-temperature phase equilibria

APPROACHES

- Ceramic thin films from aqueous media
- Thin-film gas sensors
- Surface analysis: XPS, AFM
- Materials analysis: SEM, XRD, TEM

COLLABORATIONS

- Sensor Development Corp. — N. Smilanich
- Sherwin-Williams Corp. — P. Kayima, M. Croyle
- Electronics Design Center, CWRU — C. C. Liu
- CWRU Dental School — R. Wang
- Max-Planck-Institut, Stuttgart, Germany — F. Aldinger
- Center for Cardiovascular Biomaterials, CWRU — R. Marchant

RESEARCH SPONSORS

- NSF/GOALI
- NSF/STTR
- TRW Foundation
- CWRU PRI

RECENT ACCOMPLISHMENTS

- Deposited a strong and highly adherent thin film of synthetic apatite on titanium metal for implant use. Stem cells showed *greater osteogenic behavior* on these surfaces than on commercial apatite coatings.
- Deposited *vanadium oxide film 4 μm thick in 24 h* on ammonium organic self-assembled monolayer (SAM), four times thicker than previous vanadium oxide films on amine SAMs.
- Carried out first measurements anywhere of *forces between SAMs and ceramic particles*, using an atomic force microscope (AFM) (right). Results support classical DLVO theory as well as a *particle-attachment model* for oxide film growth.

Right: Use of AFM to measure force between ceramic particle and SAM.

Below: particle on AFM cantilever.