# CASE WESTERN RESERVE UNIVERSITY
# CASE SCHOOL OF ENGINEERING

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## RESEARCH AREAS AND APPLICATIONS

- Ceramics for electronic, chemical, and biomedical applications
- Synthesis of ceramic thin films • Oxide catalysts
- Thin- film gas sensors • Ceramic fuel cell materials
- Apatite coatings for biomedical implants

## APPROACHES

- Ceramic thin films from aqueous media
- "Substrate engineering" — self-assembled organic monolayers and surfactant micelles
- Microstructural analysis: XPS, SEM, XRD, TEM, AFM

## COLLABORATIONS (extradepartmental)

- Sherwin-Williams Corp. — P. Kayima, M. Croyle
- Sensor Development Corp. — N. Smilanich
- Max-Planck-Institut, Stuttgart, Germany — Prof. F. Aldinger
- Bar-Ilan University, Ramat-Gan, Israel — Prof. C. Sukenik
- Electronics Design Center, CWRU — C. C. Liu
- CWRU Dental School — R. Wang
- SOFCo — Z. Liu, T. Cable

## RESEARCH SPONSORS

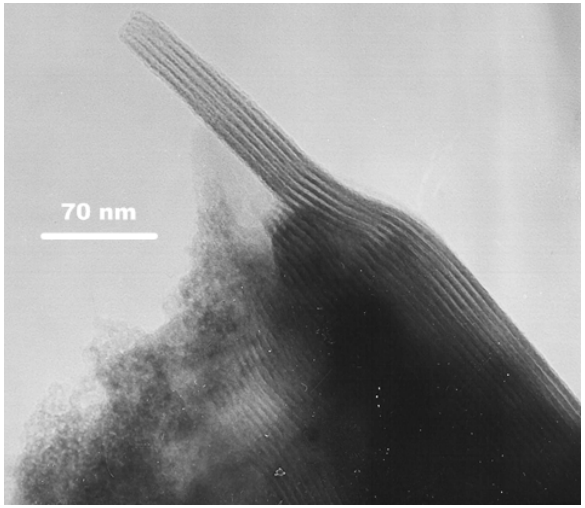
- NSF GOALI: $101 K/YR
- NSF SBIR: $100 K/YR
- Wright Fuel Cell Center: $360k
- Ohio TFF: $95K/YR

## RECENT ACCOMPLISHMENTS

- Prepared mesoporous titanium-vanadium oxide solid solutions with 4 nm pore size from aqueous solutions on micelles of N-cetyl-N,N,N-trimethylammonium bromide (CTAB). These materials are superior catalysts for the partial oxidation of lactic acid than are similar materials produced without the CTAB. (Support: NSF GOALI)

- Studied grain growth kinetics of tin oxide with and without platinum doping, and related these results to performance of chemical gas sensors. (Support: NSF SBIR)

**Titania-vanadia nanotube**




TEM image of nanoporous mixed oxide powder (45cat.% Ti, 55 cat.% V) containing oxide nanotubes. Electron and x-ray diffraction results indicate that the crystal structure is anatase, and that the average pore size of the material is 4 nm.