DIGITAL LIBRARY OF CERAMIC MICROSTRUCTURES (DLCM NSF DUE-0121540**)**
http://www.udri.udayton.edu/udri_extranet/DLCM/Home.asp

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Major activities of the project:
(1) Compilation of digital images of ceramic microstructures
(2) Database of properties of ceramic materials
(3) Virtual Experiments Laboratory (VEL, computer tool for virtual measurements related to indentation mechanics and strength-size-time behavior).

Project approach, plan of action or method:
Images of electronic ceramics, structural ceramics, and refractories are being compiled by each participating university. The growth and updating of the DLCM will depend on contributions form different sites. A review committee will approve new inclusions, depending on image quality and technological relevance.

Major expectations, findings, lessons learned or product developed:
To develop an educational library of high quality images which can be used in engineering education to emphasize the relationship between microstructure, properties and applications of materials. The DLCM already contains images from many ceramic materials including silicon carbide, silicon nitride, mullite, zirconia, spinel, alumina zirconia silicate, silica, titanium diboride, alumina, barium titanate, beta alumina, yttria, cerium oxide, Sialon, titanium silicon carbide, yttrium barium copper oxide and several composite materials, coatings and nanomaterials. Images are mainly from fracture surfaces, polished surfaces and thin ion milled foils using optical microscopy, cathodoluminescence microscopy, scanning electron microscopy and transmission electron microscopy.

Benefits the project to the overall NSDL:
To provide information and virtual experiments that will enable Educators to better explain concepts to students. The user may choose specific micrographs and data to explain certain features of ceramic materials or could measure some of the microstructural features and properties of ceramics to demonstrate the importance of microstructure-property relationships that exist in all ceramics.

Opportunities for current or future training or technical assistance for NSDL grantees:
A potential opportunity exists to expand the library and include metals and polymers.

Publications:
1. R.R. Wills, M.H. Pierson, M.K. Ferber, J. Sankar, S. Yarmolenko, V. Tennery, M. Velez, M. Karakus, N.N. Thadhani, "A Digital Library of Ceramic Microstructures (DLCM)," to be sent to *Am. Ceram. Soc. Bull*, 2003.
2.R. R. Wills, M. H. Pierson, M. K. Ferber, J. Sankar, S. Yarmolenko, V. Tennery, M. Velez, M. Karakus, N. N. Thadhani, "A Digital Library of Ceramic Microstructures (DLCM)," 28th Annual International Conference & Exposition on Advanced Ceramics & Composites and the 8th International Symposium on Ceramic Materials & Components for Energy Conversion Systems, Cocoa Beach Florida, January 25-30, 2004.
3. M. Velez, M. Karakus, R. E. Moore, UMR Digital Library: High Zirconia AZS Refractories, *Refractories Applications & News*, **7**[6] 36-37 (2002). www.ranews.info