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Argonne NATIONAL LABORATORY

Advances in Materials Genomics: Making CyberSteels Fly

The numerical implementation of established materials science principles in the form of purposeful engineering tools has brought a new level of integration to the science and engineering of materials. Building on a system of fundamental databases now known as the Materials Genome, parametric materials design has integrated materials science, applied mechanics, and quantum physics within a systems engineering framework to create a first generation of designer "cyberalloys" that have now entered successful commercial applications. Meanwhile, the DARPA-AIM initiative has broadened computational materials engineering to address acceleration of the full materials development and qualification cycle. Integration with the full suite of fundamental databases and models has demonstrated the historic milestone of greatly accelerated flight qualification for two aircraft landing gear steels. In support of the national MGI, the new NIST-sponsored CHiMaD Center for Hierarchical Materials Design expands the scope of genomic materials design across materials classes.

Greg Olson is Walter P. Murphy Professor of Materials Science and Engineering at the McCormick School of Engineering and Applied Science at Northwestern University. He is Co-director of the NIST-supported CHiMaD Center for Hierarchical Materials Design, Director of its SRG Design Consortium, and is a founder of QuesTek Innovations LLC, a materials-design company selected for Fortune magazine's list of the 25 breakthrough companies of 2005. A member of the National Academy of Engineering, the American Academy of Arts and Sciences, the Royal Swedish Academy of Engineering Sciences, and a fellow of ASM and TMS, he has authored more than 270 publications. He received a B.S. and M.S. in 1970 and Sc.D. in 1974 in materials science from MIT and remained there in a series of senior research positions before joining the faculty of Northwestern in 1988. Beyond materials design, his research interests include phase transformations, structure/property relations, and applications of high-resolution microanalysis. Recent awards include the ASM Campbell Memorial Lectureship, the TMS-SMD Distinguished Scientist/Engineer Award, the Cambridge University Kelly Lectureship, the ASM Gold Medal, and the TMS Morris Cohen Award.

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APS Colloquium

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