

Abstract Submitted
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Oxide-Dispersion Strengthened Nanoparticulate Composites with Application to Magnetic Materials ROBERT CAMMARATA, STEPHEN FARIAS, Johns Hopkins University, CHAI-LING CHIEN, Johns Hopkins University — Metal matrix nanocomposites have been fabricated by a novel electrochemical deposition method in order to produce enhanced yield strength and creep resistant materials. Metals have been synthesized from an electrolytic solution containing a suspension of oxide nanoparticles. Using a rotating disk electrode, metal samples with a uniform dispersion of oxide nanoparticles are obtained. By controlling the concentration of particles in the solution, the electrode rotation rate, and deposition current density, the volume fraction of oxide in the nanocomposite can be sensitively controlled. Low load indentation testing reveals a substantial increase in room temperature yield strength compared to single phase metals that is close to that predicted from classical hardening models. Particular attention has been given to magnetic materials such as Ni and FeCo with the aim of producing materials with improved mechanical behavior without significant degradation of the magnetic properties.

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