

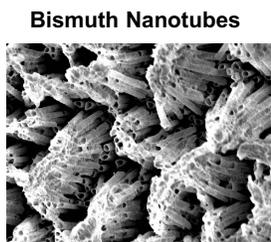
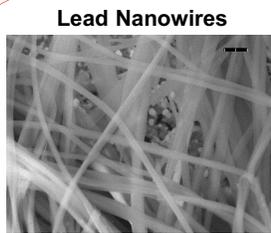
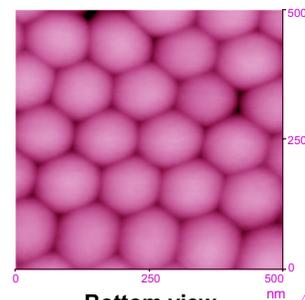
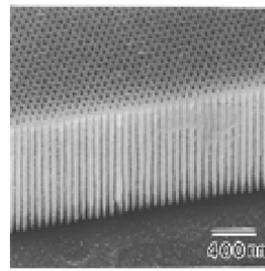
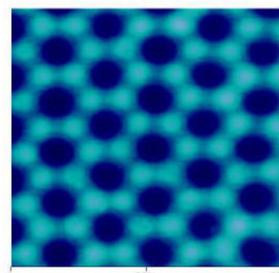
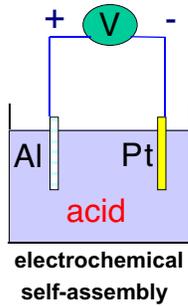
Template Synthesis of Novel Nanostructures

Z. L. Xiao, C. Y. Han, U. Welp, V. K. Vlasko-Vlasov, H. H. Wang, G. A. Willing, J. M. Hiller, R. E. Cook, D. J. Miller, W. K. Kwok, and G. W. Crabtree

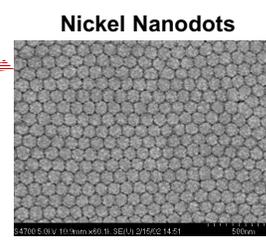
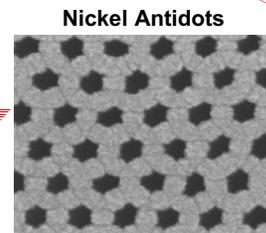
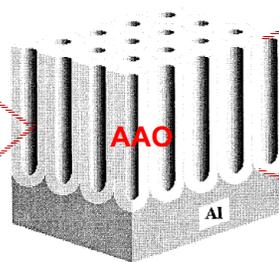
Motivation

- New Approaches to fabricate nanostructures including nanowires, nanotubes, nanoscale dots and antidots
- Novel phenomena in confined magnetic, superconducting and quantum materials
- Potential applications in nanoscale devices and catalysis

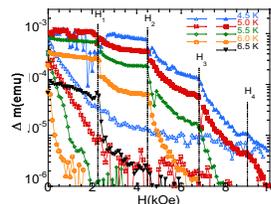
Anodic Aluminum Oxide (AAO) Templates



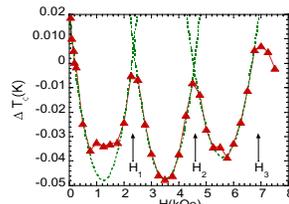
Nanostructures



Novel Properties in Nb Antidot Arrays



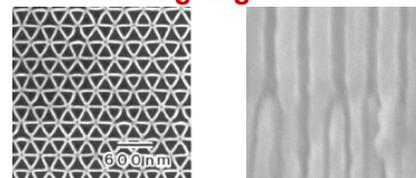
Matching effect & I_c Enhancement



Little-Parks T_c oscillation

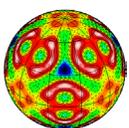
Z. L. Xiao et al., *Appl. Phys. Lett.* 81, 2869 (2002)

Ongoing Work



Triangular Shaped & Branched AAO Channels

- Pursuing properties of existing nanostructures
- New nanostructures using AAO with controlled shapes and branching (see above images)
- Applications of novel nanostructures, e.g. ultra-high density recording media, hydrogen sensors and catalysis.



BES - DOE

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MSD - ANL

