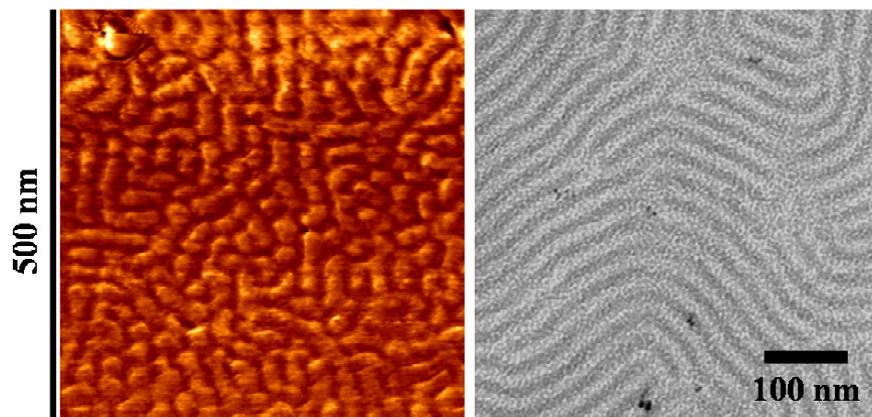
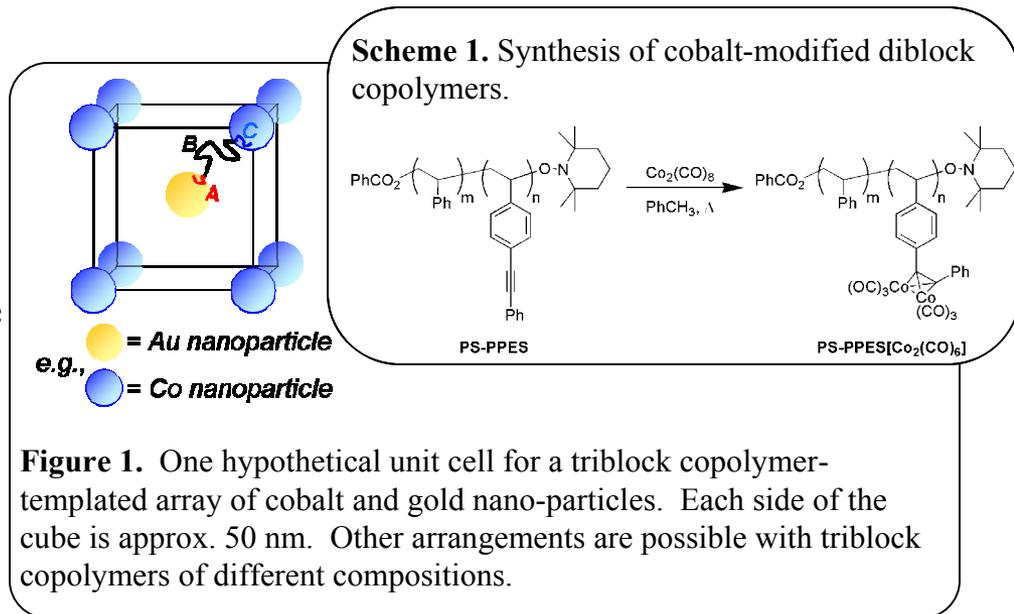


# CAREER: Development of Novel Ternary Copolymer Assemblies

Robert B. Grubbs, Dartmouth College, DMR-0239697

The self-assembly of block copolymers in solution and in bulk leads to the localization of specific chemical functionality to well-defined nanometer-scale regions in three dimensional space. We are attempting to use this phase separation to prepare arrays of multiple nanometer-scale metallic particles in polymer films. Our initial efforts have targeted the simultaneous incorporation of gold (conducting) and cobalt (conducting and magnetic) nanoparticles within the same polymer film (Figure 1). The resulting materials have potential use as magnetic storage media or photonic materials. Preliminary experiments have focused on the preparation of model cobalt-containing systems based upon blocks functionalized with carbon-carbon triple bonds (Scheme 1 and Figure 2; accepted for publication in *Macromolecules* 2004).



**Figure 2.** AFM image of a cobalt-modified diblock copolymer (left, cobalt-rich regions appear brighter); and TEM image of the same polymer (cobalt-rich regions appear dark).

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## Education:

Four Ph.D. students, Laura Sessions (4<sup>th</sup> year), Ryan Lau (4<sup>th</sup> year), Yu Cai (3<sup>rd</sup> year), and Qing Xia (2<sup>nd</sup> year); two Post-docs, Dr. Liliana Mîinea and Dr. Tim Stephan; and three undergraduates, Ben Cohen (4<sup>th</sup> year), Emily Bussigel (3<sup>rd</sup> year), and Gloria Sheng (3<sup>rd</sup> year), are currently involved in this research.

Jesse McCann (now a Chemistry Ph.D. candidate at U. Washington), Kjell Ericson, and Jakub Wegrzyn (joining the Polymer program at MIT in Fall 2004) worked in the lab while undergraduates at Dartmouth. Ben Stokes (U. Wisconsin), Andy Wills (Carleton College), and Analiz Rodriguez (New College, FL) participated in aspects of this research through the Dartmouth NSF-REU program in Molecular Materials.

A group picture appears to the right.

## Outreach:

An informal biannual meeting, the New England Polymer Chemistry Workshop, has been developed in collaboration with researchers in the greater geographical area and is currently in its second year. These workshops provide professors, post-docs, graduate students, and undergraduates with regular opportunities to discuss their research with others and is leading to the development of collaborations across institutional lines.

