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**Functional Microstructures from Iron-Containing Block Copolymers**[1]

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We have studied the properties of microstructures formed by diblock copolymers composed of an organic block such as polystyrene or polyisoprene, and an iron-containing block such as poly(vinyl ferrocene) or poly(ferrocenyldimethylsilane). We demonstrate that the thermodynamic state of these block copolymers can be controlled by altering the redox state of the ferrocene (Fc) moieties. Oxidizing only 8% of the Fc block results in a 40 K drop in the order-disorder transition temperature. Fc is catalytically active in the oxidized state. Thus one can obtain catalysts from iron-containing block copolymers wherein both the support and the active sites are formed by self-assembly. An interesting property of ferrocene is the fact that its oxidation state can be altered reversibly by the application of small electric fields ($\sim$2V/cm). We are currently exploring the possibility of using electric fields to control the microstructure and function of our iron-containing block copolymers.

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