Designing Magnetic Nanowires for Nanowarming, Isolation, and FMR-Identifications of Biomarkers

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Magnetic nanoparticles can be designed for contactless heating and isolation of biomarkers using magnetic measurements, such as minor loops and first order reversal curves. A relatively new application, nanowarming cryopreserved organs [1-3], requires uniform heating that is much faster than 50°C/min to avoid crystallization of vitrified cryoprotective agents (CPA), which act as antifreeze buffers. Magnetic nanowires (MNWs) can be designed to have nanowarming rates up to 1000 °C/min (5 mg Co35Fe65/ml VS55) were achieved, which is 20x faster than the critical warming rate for VS55 and other common CPAs. MNWs also have excellent potential for nanowarming cryopreserved tissues, in addition to enrichment [5] and MRI contrast [6] as shown previously.

Bio: Bethanie Stadler (BS CWRU 1990; PhD MIT 1994; NRC postdoc) is an Electrical & Computer Engineering Professor and a Chemical Engineering & Materials Science Graduate Faculty at the University of Minnesota. She won the NSF CAREER award and McKnight Presidential Fellowship. Stadler has served as Director, Secretary, and chair of program development for MRS. She taught at the IEEE Magnetic Summer School in Chennai India & Assisi Italy. She was a 2015 Distinguished Lecturer for the IEEE Magnetics Society, giving about 60 talks in 14 countries, and is a Fellow of the MRS.