

Abstract Nora Dempsey:

RE-TM micro-magnets for MEMS and bio-medical applications

For the same reasons that RE-TM magnets are attractive for use at the macro-scale (high energy density, contactless actuation, stability...), they are also very appealing for use at the micro-scale. Furthermore, the magnetic field gradients produced by a permanent magnet scales up as the size of the magnet scales down, resulting in an increased force per unit volume. There is thus great potential for using high performance RE-TM based micro-magnets in a wide range of applications.

In this talk I will briefly review our work on the development and micro-patterning of hard magnetic films and the low-cost fabrication of micro-magnet arrays based on hard magnetic powders. I will present a Scanning Magneto-Optic-Kerr-Effect system that incorporates an original pulsed magnetic field source, developed for the high throughput non-destructive characterisation of coercivity across compositionally graded hard magnetic films. I will then describe recent advances made in the quantitative characterisation of stray fields and forces produced by micro-magnets using Scanning Hall Probe Microscopy and Magnetic Force Microscopy with specially designed probes. Finally I will give examples of bio-medical applications of the micro-magnets we have developed.