

High-resolution magnetic imaging based on scanning probe techniques

U. Hartmann

Scanning tunneling microscopy (STM) which was invented in 1981, stimulated the development of various scanning probe methods which became important analytical tools in many branches of solid state research. In the meantime, some of the STM offsprings, especially atomic force microscopy (AFM), even became relevant for industrial applications, e.g., for routine sub- μm quality control measurements. Systematic applications of the new techniques in the analysis of magnetic materials started in 1987 with the invention of magnetic force microscopy (MFM). Subsequently spin-polarized scanning tunneling microscopy (SPSTM) and scanning near-field optical microscopy (SNOM) were shown to be at least potentially ultrahigh-resolution magnetic imaging techniques. In the following, a review is given on the state of the art in magnetic imaging by scanning probe microscopies. Special emphasis is put on the capabilities, on still remaining problems and on present trends in the development of further related techniques.