



Sonderforschungsbereich 595

Elektrische Ermüdung in Funktionswerkstoffen



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Piezoresponse Force Microscopy as universal tool to characterize ferroelectric materials

Ferroelectric materials are found in a wide range of application from memory devices to actuator applications. The progress in these applications necessitates understanding the ferroelectric domain structure and the basic physics of local polarization switching. The only method which provides these information on the nanoscale is Piezoresponse Force Microscopy (PFM). Therefore a small ac field is applied to a conductive tip in contact to the sample which is part of a conventional Atomic Force Microscope (AFM). Due to the piezoelectric effect the ferroelectric domains expand or contract which can be detected by the AFM tip. The signal is analyzed by a lock-in technique and provides information about the orientation of the ferroelectric domain underneath the tip and about the strength of the local piezoelectricity. PFM cannot only be used to image domains but also to manipulate them by applying a dc voltage to the AFM tip. In the last few years PFM became a standard tool to image ferroelectric domains in all kind of ferroelectric materials which is widely used. At the same time this method is developed further to characterize ferroelectric materials on an advanced level. The newest developments include Switching Spectroscopy PFM (SS PFM) and Band Excitation PFM (BE PFM). In this talk the method PFM is explained in detail and several examples of advanced PFM characterization possibilities are given.

Die Vorträge finden, wenn nicht anders angegeben, jeweils um **16:15**
im Gebäude der Materialwissenschaften, Lichtwiese, Petersenstr. 23, **Raum 77** statt