

Nanoindentation studies of contact materials used for sliding electrical contacts

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Nanoindentation is used to probe the local mechanical properties of materials such as hardness or E-modulus. In addition, modern instruments also allow scanning the surface using either the nanoindenter or the sample stage in order to derive the 3D surface topography.

The aim of the investigations described in this paper is two-fold: Firstly, hardness and E modulus measurements of some selected materials, especially thin precious metal layers, are described. Secondly, the stage movement of the nanoindenter (G200, MTS) is used to probe the 3D surface structure and the potential of this method to quantify wear is studied.

First results show that the surface structure of materials used for sliding electrical contacts makes precise measurement of hardness and E modulus challenging. The reason is that smooth surfaces are not necessarily good electrical contacts. However, a nanohardness experiment normally necessitates a flat geometry at the measurement position.

Preliminary experiments using the stage movement of the nanoindenter show that a 3D surface measurement is possible. In a next step wear tracks of sliding electrical contacts will be analyzed and the measurements will be compared to results obtained using confocal microscopy.