

Subnanometer scale tribological properties of nitrogen containing carbon coatings used in magnetic storage devices

A. Wienss, G. Persch-Schuy, R. Hartmann, U. Hartmann and P. Joeris

Ultrathin carbon coatings are used in the magnetic storage industry to protect sensitive sensor heads and magnetic media against corrosion and mechanical damage. Such damage can be modeled by artificially generated scratches using scanning force microscope techniques. Loading forces in the μN range are applied, resulting in scratches with residual depths of only a few Å. A special image subtraction technique is used which allows careful analysis of tiny grooves even on rough surfaces. The scratching resistance of various CN_x films, magnetron sputtered on hard disks with a thickness of about 12 nm, was determined and found to improve with an increased nitrogen content (6–16 at.%). This behavior, together with a linear downward shift of the Raman *G*-peak position from 1569 to 1564 cm^{-1} , supports the assumption that the incorporation of nitrogen increases the fraction of sp^3 bonds.