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Brillouin scattering study of TiC hard films

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The dispersion relation of surface acoustic waves in TiC thin hard films of various thicknesses on silicon and silicon carbide substrate is studied using Surface Brillouin scattering. Simulations of surface Brillouin scattering (SBS) spectra of TiC thin hard films on silicon and SiC substrates have been carried out over a range of film thickness from 5nm to 1000nm. The simulations are based on the elastodynamic Green's function method that predicts the surface displacement amplitudes of acoustic phonons. These simulations provide information essential to understand and analyze experimental data emerging from SBS experiments. There are striking differences in both the simulated and experimental SBS spectra depending on the respective elastic properties of the film and the substrate. In fast on slow situations (TiC on Silicon), the Rayleigh mode is accompanied by broadened resonances; in slow on fast situations (TiC on SiC), several orders of Sezawa modes are observed together with the Rayleigh mode and sharper resonances. The velocity dispersion of the modes as a function of the product of surface wavevector and thickness (k/d) has also been simulated and obtained experimentally, allowing the elastic constants of the films to be determined.

Level (Hons, MSc, PhD, other)?

PhD

Consider for a student award (Yes / No)?

Yes

**Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?**

No

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