Mechanical Stress Produced In Semiconductor Materials By Dielectric Thin Film Nanostructures

Jean-Pierre Landesman[1], Brahim Ahammou[1], Solène Gérard[1]

[1]University Rennes-1, France

Abstract

We investigate the effects of the presence of a thin dielectric material layer at the surface of a semiconductor. The dielectric material can include some built-in stress, due to the deposition conditions (e.g. ion bombardment occuring in the deposition process) and to the difference in CTE with the underlying semiconductor. The dielectric thin film can then etched to form a nanostructure (for example a stripe). This is a building block in many semiconductor devices. We have modelled and measured the mechanical stress distribution induced by such structures. This mechanical stress can be deleterious, for example in terms of the device performance and reliability. It can also be turned into a way to engineer some of the properties of the semiconductor materials. Photoelastic optical waveguides can for example be designed and fabricated.