Abstract

The aim of this thesis is to study experimentally and theoretically materials and structures using Nanoindenter. These materials are important in various fields of our daily life, such as technology, industry, medicine and others. This thesis contributes the promotion of research providing new insights on issues previously identified, and also gives ideas for the production of new products.

During this thesis, in the first phase we have shared two theoretical approaches that we can explain the indendation size effect (ISE), which observed during nanoindentation using conical and spherical indenters, with the help of Aifantis gradient plasticity theory. Then we performed four experimental series in materials and structures such as silicon wafers, nanocomposite dental materials and structures based on ITO with nanoindenter having each time different aim.

In conclusion we came up with rather interesting assumptions which will most probably lead the way for upcoming reflections for a more in depth research on this subject.