Abstract

In the present article are revised the most important aspects related with the preparation and characterization of thin SiO2 based coatings (500 nm), and also some of their potential applications as physical and chemical barriers. The preparation and characterization of decorative coatings is also addressed. For the use of these materials, in the above mentioned applications, it is necessary to produce coatings with dense structures, i.e., with minimum porosity. It is shown how by choosing the appropriate hydrolysis/condensation routes in the sol-gel process, it is possible to prepare coatings with low porosity. This is achieve when the starting solutions have a H2O/TEOS molar ratio larger than 5. It is also shown how the incorporation of sub-micrometric of alfa alumina particles, into the starting solutions, closes the SiO2 structure. Samples with the alumina have structures similar to the reported for the thermally grown silicon oxides on silicon wafers, used in the microelectronic industry. It is described the methodology used to produced colored glasses by the incorporation of molecular dyes. These glasses have strong coloration with optical densities exceeding 1. To characterize the structure of these materials, we have use indirect analytical techniques such as: spectroscopy (Raman and infrared absorption), oxygen diffusion and the dielectric breakdown. This article shows a simple model, which allows the evaluation, in a qualitative way, of the degree of structural disorder in SiO2, this method is based on the Raman and IR spectra. The oxygen diffusion coefficient for the SiO2 coatings were deduced using experimental methods recently developed. For that, the Raman spectroscopy and the reflected light of a laser beam were used.

Keywords

sol-gel, SiO2, recubrimientos nanocompuestos