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The influence of the hydrophobic agent, catalyst, solvent and water content on the wetting properties of the silica films prepared by one-step sol-gel method

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Abstract

In this paper, we used one-step sol-gel process to prepare the hydrophobic silica films on the glass substrate from the ethyltriethoxysilane (ETES) as a precursor and iso-octyltrimethoxysilane (Iso-OTMS) as a hydrophobic agent. In order to study the effect of the hydrophobic agent on the water repellent properties of the silica films, the alcosol was prepared by keeping constant the molar ratio of ETES:EtOH:H_2O at 1:36.2:6.3, with 6 M ammonium hydroxide and Iso-OTMS/ETES molar ratio varied from 0.2 to 1.4. Also, we investigated the influence of the other sol-gel reaction parameters, such as catalyst, solvent and water content and their effect on the morphology and hydrophobic properties of the silica films. The results revealed that by altering the molar ratio of NH_4OH, EtOH and H_2O, different sizes of silica nanoparticles from 41.24 to 86.16 nm were obtained. The silica films were characterized by Atomic force microscopy (AFM), Fourier transform infrared spectroscopy (FT-IR), Field emission scanning electron microscopy (FE-SEM) images, Contact angle measurement (CA) and Percentage of optical transmission.

Keywords: ETES, Iso-OTMS, Silica Film, Sol-Gel Method, Dip Coating.

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