

Nanostructured substrate effects on diamond-like Carbon films properties grown by pulsed laser deposition

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Abstract

A study on the effect of using a nanostructured substrate in the growth of a diamond-like carbon (DLC) film by pulsed laser deposition (PLD) has been carried out. It was found that the deposition on a nanoporous substrate gives origin to a film with a lower ratio of the sp³ to sp² hybridizations of carbon atoms bondings as compared to a film deposited on a flat substrate under the same conditions, namely flat Silicon (Si) or Aluminum (Al) foil. This could be a consequence of a local stress relaxation during the growing process induced by the nanoporous structure of the substrate, suggesting that it might not be possible to obtain a high content of tetrahedral amorphous carbon when that kind of substrates is used. Motivated by previous investigations of nanodots growth using a nanoporous alumina substrate, a low pressure Argon background was used during the deposition process, in order to achieve different values of the sp³ content..

Keywords

DLC, PLD, Nanostructured substrate, Carbon nanodots, AFM, Raman.