

Deposition of nanocrystalline diamond films on temperature sensitive substrates for grazing angle reflectance spectroscopy

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Due to diamond chemical and abrasion resistance, it is often used as a protective material for brittle and soft substrates. On the other hand, low diamond adhesion or substrate damaging during a harsh chemical vapor deposition (CVD) are the limiting factors for wider commercial uses of these films [Costello et al: *Diamond & Relat. Mater.* 3 (1994) 1137]. In the present work we report on optimized deposition of thin nano-crystalline diamond films on mirror substrates (Al/glass). Top SiO₂ layer was used to improve the diamond adhesion and to protect Al layer during the CVD growth. Standard focused microwave plasma system results in damaging substrates due to high temperature gradient between plasma and the substrate holder. A homogenous, high quality diamond growth was achieved in CO₂/CH₄/H₂ gas mixture by linear antenna pulsed microwave plasma system. Mirror coated with diamond layer were successfully used as chemically functionable substrates for detection of adsorbed molecules (i.e. proteins) by grazing angle reflectance spectroscopy.