

Effect of Au/Mg overlayer and Si substrate biasing on the nucleation and growth of diamond using HFCVD

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Diamond nucleation and growth on non-diamond substrates is an issue of current interest. In order to elucidate the mechanism of diamond formation, analysis of the interlayer between the substrates and the diamond film is often performed. It has been suggested that substrates may be divided into several major groups according to their interaction with carbon. Diamonds were grown successfully from Cu, Zn, and Ge, but not from Au. Here, we made an attempt to use two buffer layers on silicon substrate to get the dense and good quality diamond films. The Au and Au/Mg overlayer on pre-treated silicon substrates was deposited by physical vapor deposition with ~10–6 torr base pressure. The substrate temperature during diamond growth was maintained at 750–850 °C. 1:100 volume % pressure of H₂ and CH₄ gases was used for deposition at a total pressure of 30 torr. The total time for deposition was kept 2 hours and the characterization of diamond films were carried out by using Scanning Electron Microscopy (SEM), (EDAX) and Raman analysis.