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Chemical vapor deposition of diamond films on patterned substrates

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The interest in using CVD diamond in the fabrication of microelectro-mechanical components has steadly increased over the last few years. Typical technology for manufacturing such components involve the molds patterned in silicon or silicon dioxide, which are filled by diamond deposition. The degree of conformality of the CVD film and the characteristics of the diamond-substrate interface becomes critical for the successful fabrication and performance of such devices. We have investigated the growth of CVD diamond films on patterned substrates using a microwave plasma assisted deposition reactor. In particular the use of seed layers to enhance nucleation on horizontal and vertical walls as well as to promote complete filling of narrow trenches is investigated. Transmission electron microscopy and atomic force microscopy are used to characterize the diamond film and interfaces.