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**Highly selective deposition of CVD diamond on Si wafers by using a combined technique of photolithography and ion etching**

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We report the development of a new technique of highly selective deposition of polycrystalline diamond films on monocrystalline silicon wafers. This technique based on the deposition of desired pattern by using standard photolithography with addition of a nanodiamond suspension in photoresist, and the subsequent ion etching the surface of wafer. Ion etching is allows to remove the remaining parasitic nanodiamond particles in areas where the diamond film should not grow. Etching was carried out with 3.5 keV argon ions generated with closed drift ion source. Diamond films were deposited in selective regions using high-current glow discharge PACVD reactor. The effects of the nanodiamond concentration in photoresist and the thickness of etching layers on the nucleation density of diamond were also investigated. The resolution of this method appears to be around 1-3  $\mu\text{m}$ . This technique is much simpler than those that are currently in use (e.g. selective oxidation method), and is very promising for the development of different microelectronic devices, displays, sensors, etc.

**Keywords**

Chemical vapor deposition  
diamond film  
nanodiamond  
ion etching  
photolithography