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Growth of large area diamond layers using linear antenna MW PECVD apparatus for passive and active applications

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The use of microwave plasma enhanced chemical vapour deposition resonant cavity based systems for the growth of diamond layers is a well-established and understood technique, but fundamentally it is limited in the deposition area and therefore limiting its application for multi wafer handling technologies. In this work we review the preparation and characterisation of intrinsic, nitrogen and boron doped diamond layers grown over large areas, over a range of temperatures from 250 °C to 800 °C using the relatively recently developed microwave plasma enhanced linear antenna chemical vapour deposition apparatus (MW-LA-PECVD), which due to its design and modular nature can enable diamond coating of multiple wafers. We describe the linear antenna system used and discuss the principal layout of the coaxial line plasma source. We discuss the effects of growth parameters such as chemistry, pressure and high frequency microwave pulsing on the diamond layer characteristics. Finally, we present examples of the applications of diamond layers produced in the MW-LA-PECVD system from passive protective layers to active layers used in MEMs devices.

Keywords

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