

INFLUENCE OF DEPOSITION PARAMETERS ON PROPERTIES OF POLY CRYSTALLINE DIAMOND FILMS

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Diamond is well known for its mechanical, thermal, chemical, and electrical properties. Also, diamond is a wide band gap material with low atomic number and exhibits very high radiation resistance even to the strong flux of high energy particles in detectors [1], therefore, diamond is a perfect candidate for beta voltaic batteries application [2]

In this work diamond films were deposited using a hot wire chemical vapour deposition (HW-CVD) reactor. Methane, hydrogen and argon gases with a different gas flow ratios were used for diamond deposition. The Raman peak at 1332 cm^{-1} was the evidence for the presence of diamond phase in the deposited layer. From AFM analysis it was found that decreasing the methane gas flow leads to lower deposition rate and lower surface roughness. Also, the depositions were carried out at different pressure in the range of 5 – 20 Torr with the fixed gas flow. It was concluded that the highest deposition rate with the most pronounced first-order diamond Raman peak were achieved at 10 Torr pressure using 2% methane and 98 % hydrogen gas mixture.

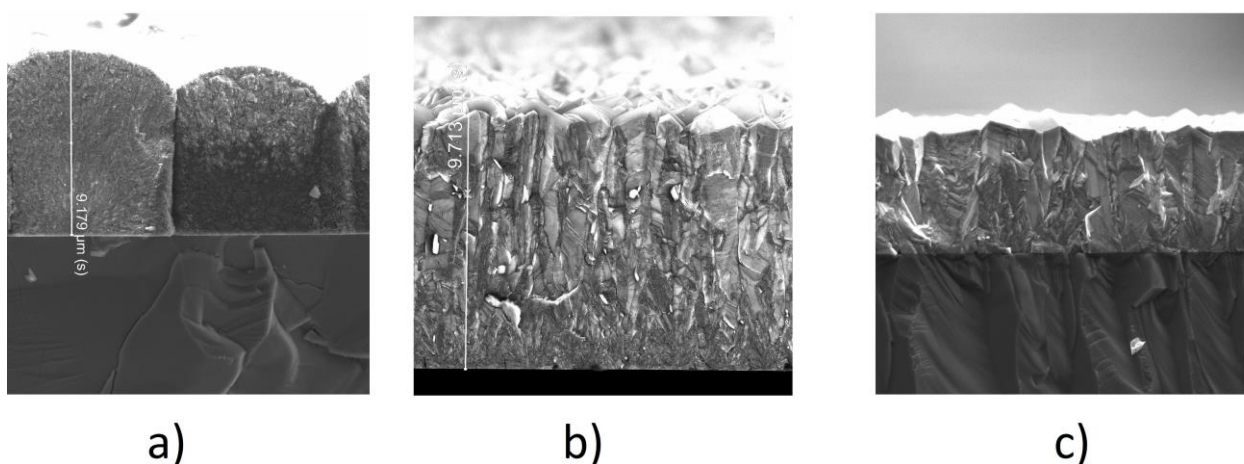


Fig. 1. Deposited diamond films on silicon substrate at different H_2 gas flow: a) 50 sccm b) 100 sccm c) 150 sccm. Pressure - 10 Torr pressure, heater temperature - 1023 K, CH_4 gas flow - 2 sccm.

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