
SEMINAR FIZIČKOG ODSJEKA

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Fabrication of buried conductive channels in single crystal diamond with ion microbeam induced graphitization

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The process of ion-induced graphitization in diamond has been studied since the 70s. In particular, the electrical conduction mechanisms involved in the transition from the insulating diamond structure to a conductive graphitic phase have been investigated in detail. Remarkably, previous works were performed at relatively low energies (20-320 keV), determining the formation of superficial graphitic paths. Such conductive paths have been employed as IR emitters or contacts for field emitters.
In the present work we report on a novel method for the fabrication of three-dimensional buried graphitic micropaths in single crystal diamond with the employment of focused MeV ions.
The use of implantation masks with graded thickness at the micrometer scale allows the formation of conductive channels which are embedded in the insulating matrix at controllable depths. In particular, the modulation of the channels depth allows the surface contacting of the channel terminations without further fabrication stages. Channels implanted with different sizes and ion fluences were characterized with IV measurements. Scanning probe and optical profilometry were employed to study the swelling effects associated with ion-induced damage.
The application of buried conductive channels in diamond to devices of technological interest will be discussed.

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