HL 37 Invited Talk Bustarret

Time: Thursday 09:30–10:15 Room: HSZ 01

Invited Talk HL 37.1 Thu 09:30 HSZ 01

Superconducting boron-doped single crystal diamond — •Etienne Bustarret[1], Jozef Kacmarcik[1], Thierry Klein[1], Benjamin Sacépé[2], Claude Chapelier[2], Christophe Marcenat[2], Emmanuel Bourgeois[3], and Xavier Blase[3] — [1]LEPES-CNRS BP166, 38042 Grenoble, France — [2]SPSMS-DRFMC CEA, 17 rue des Martyrs, 38054 Grenoble, France — [3]LPMN-UCB, 43 Bvd 11 nov. 1918, 69622 Villeurbanne, France

Although the early observation of superconductivity in semiconductors was considered in the 60's a validation of the BCS model, experimental evidence for superconductivity in boron-doped diamond came in 2004 as a major surprise to both the diamond and the superconducting materials communities. After reviewing recent literature, we focus on the growth and structural properties of homoepitaxial boron-doped layers before showing that in {001}-oriented epilayers superconductivity occurs above a critical boron density around 5 E20 cm-3 , close to the critical concentration for the metal/non metal transition. Resistivity and ac susceptibility measurements yield also the H(T) phase diagram of this type II-superconductor in the dirty limit. Since low temperature scanning tunnel microscopy shows that the local gap of excitations has a shape and a temperature-dependence compatible with a BCS-type pairing mechanism, experimental data and ab initio supercell calculations are then presented in order to discuss the strength of the electron-phonon coupling. Finally, the main properties of the vortices (core and Abrikosov lattice) imaged under a moderate magnetic field are also discussed.