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Hole-doped diamond: a 3D version of MgB2? JENS KORTUS, Leipziger Str. 23, D-09596 Freiberg (Germany), LILIA BOERI, OLE KROGH ANDERSEN, Max-Planck Institut fuer FestKoerperForschung, Heisenbergstrasse 1, D-70569 Stuttgart, Germany — The discovery of superconductivity in heavily-boron doped diamond in 2004 has caused great excitement both in the fields of superconductors and of semiconductors. In this contribution we show, via first-principles and analytical calculations, that the observed superconductivity can be explained with an electron-phonon mechanism very similar to the one which is causing superconductivity in MgB2: holes at the top of the zone-centered, degenerate σ bands couple strongly to the optical bond-stretching modes. We discuss similarities and differences between the two materials, the doping dependence of the critical temperature and the possibility to observe superconductivity in the other group-IV semiconductors.

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