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# Spectroscopy of B-doped diamonds: experiment vs. theory

F. Farges (1,2), J. Vinson (3), J. R. Rehr (3), and J. E. Post (4)

(1) Laboratoire de minéralogie et de cosmochimie du Muséum, Muséum national d'Histoire naturelle, UMR CNRS 7202, Paris, France, (2) Dept. of Environmental and Geological Sciences, Stanford University, USA, (3) Dept. of Physics, University of Washington, Seattle, WA 98195-1560, USA, (4) Department of Mineral Sciences, Smithsonian Institution, Washington, DC 20560, USA

The blue color of diamonds typically arises from ppm amounts of boron that acts as a semiconductor acceptor ($p$-type). This can be compensated by a single N substitution, which acts as an electron *donor*. To contribute to that understanding, the optical absorption spectroscopy of the 'Hope' dark blue diamond was measured between 250 and 900 nanometers. In parallel, theoretical first-principles Bethe-Salpeter equation calculations of the optical absorption of substitutionally B-, and N-doped diamond were carried out based on a DFT-relaxed diamond cluster of 64 atoms using ABINIT. Based on this cluster, UV-VIS-NIR optical spectra were calculated that is comparable to that measured for the 'Hope' diamond. Briefly, the results show that B-doped diamonds absorb preferentially in the red to NIR range. Based on that result, we can show that the "Hope" diamond is in fact a light blue diamond: its dark blue color arises mostly from its faceting. Application to the "Tavernier Blue" and "French Blue" – two lost historical diamonds - will be presented too.