PHOTOLUMINESCENCE AND STRUCTURE OF C_{60} INTERCALATED WITH HELIUM

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Powder x-ray diffractometry was employed to study infusion of He into C_{60} fullerite. It has been shown that the intercalation at a pressure of 1 Bar is a two-stage process, the first stage being the saturation of the octahedral voids, virtually complete after 55 hr. Photoluminescence spectra were taken at 5 K from C_{60} with completely saturated octahedral voids. Helium in the lattice voids is shown to reduce that part of the luminescent emission which is due to 0-0 transitions around 1.69 eV from the so-called deep traps, or according to existing notions, the covalently bound pairs of C_{60} molecules. The effect of He intercalation on polymeric dimer formation is ascribed to the changes in the pentagon to hexagon configuration ratio caused by the intercalation-related increase of the lattice parameter and the formation of bound states of He atoms in the C_{60} lattice voids.