

INTERCALATION OF IODINE PENTAFLUORIDE INTO HOPG

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Iodine pentafluoride intercalates into highly oriented pyrolytic graphite (HOPG) in the presence of fluorine. X-ray (001) diffractograms on samples which were no longer in equilibrium with the $IF_5 + F_2$ atmosphere showed the presence of three different systems with filled layer spacings of 6.0, 9.4 and 8.5Å, respectively. Under these conditions all three systems are unstable, but the 8.5Å system is somewhat more stable than the others. The 6.0Å system is probably identical with the one obtained upon intercalation of graphite with fluorine.[1] Over a period of several months, one can observe conversion from lower to higher stages within the same system. One also observes conversion from the 6.0 and 9.4Å systems to the one with repeat distance $d = 8.5 + (n-1) 3.35\text{Å}$ ($n = \text{stage}$). This conversion process is associated with a temporary disappearance of all (001) reflections indicating large fluctuations due to order-disorder transitions. Later on, low angle reflections appear, but higher order harmonics are still missing. The latter appear eventually indicating establishment of a new well-defined phase with long range order.

The different systems are probably associated with different intercalated chemical species which convert spontaneously from one to another. Electron microprobe analyses show evidence for chemical reactions during which elemental iodine is liberated with consequent changes in the I:F ratios. Although the exact nature of the intercalated species is unknown, preliminary ^{127}I Mossbauer spectra show the presence of IF_5 and IF_6^- .

- 1 I. Mallouk and N. Bartlett, J.C.S. Chem. Comm. (1983) 103.
- 2 Y. Palchan, D. Davidov and H. Selig, *ibid.*, 657.

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