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PREPARATION AND ELECTRICAL CONDUCTIVITY OF FLUORINE-INTERCALATED GRAPHITE FIBERS

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Fluorine-graphite intercalation compounds were prepared in the presence of CuF_2, AgF or TiF_4, and their electrical conductivities and stability were examined.

Since these metal fluorides are hygroscopic, starting materials were metal powders, which were fluorinated at 200°C in a nickel reactor and successively used for the experiments. After repeating the introduction of fluorine into the reactor and the evacuation 3 times using rotary and diffusion pumps, no absorption due to hydrogen fluoride was confirmed by IR spectrum in every run of experiment in order to avoid cointercalation of hydrogen fluoride and fluorine.

When CuF_2 and AgF were used, fluorine was intercalated into graphite and a trace of metal fluoride was detected in GIC. Experimental results suggest that these metal fluorides act as catalysts to aid the intercalation of fluorine. AgF having a lower melting point than CuF_2 was more effective for fluorine-intercalation. On the other hand, highly volatile TiF_4 was cointercalated with fluorine at around 200°C. The electrical conductivity was increased with increasing intercalated fluorine and reached the maximum value at the 3rd stage. The maximum conductivities were 9, 8 and 6 times those of pristine vapor-grown, pitch-based and PAN-based carbon fibers, respectively. The stability of GIC was the reverse order.