

## DOPING OF $(CH)_x$ FILMS TO THE METALLIC STATE WITH METAL HEXAFLUORIDES

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When polyacetylene films,  $(CH)_x$ , are exposed to the vapours of hexafluorides, the resistances of the films drop rapidly. The following hexafluorides were shown to dope  $(CH)_x$  to the metallic state:  $SeF_6$ ,  $TeF_6$ ,  $WF_6$ ,  $ReF_6$ ,  $OsF_6$ ,  $IrF_6$ ,  $MoF_6$ ,  $UF_6$  and  $XeF_6$ . Conductivity vs degree of doping curves obtained for  $WF_6$ ,  $MoF_6$  and  $UF_6$  exhibit a shape similar to that observed for  $AsF_5$ ; namely, an increase in electrical conductivity of several orders of magnitude at low concentrations until a point when additional doping has little further effect. Parallel e.s.r. line-shape measurements confirm metallic behaviour above a critical transition. The highest conductivity observed in the series is  $350 \Omega^{-1} \text{ cm}^{-1}$  for  $[CH(WF_6)_{0.087}]_x$ . The maximum observed for the  $XeF_6$  doped polyacetylene was about  $0.1 \Omega^{-1} \text{ cm}^{-1}$ . The other hexafluorides gave materials which show intermediate conductivities. The  $XeF_6$  doped polyacetylene is not stable, presumably because of internal fluorination of the  $(CH)_x$  by the dopant.

## CHARACTERIZATION OF THE +III OXIDATION STATE OF PALLADIUM IN $NaPdF_4$

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Trivalent oxidation state has been unequivocally obtained in a palladium compound:  $NaPdF_4$ , and characterized by ESR. The synthesis is carried out by solid state reaction from a  $2NaF + Pd_2F_6$  mixture.  $NaPdF_4$  is obtained at  $600^\circ\text{C}$  under 70 kb pressure and quenched back to ambient conditions.  $NaPdF_4$  is a hygroscopic grey powder whose structure derives from the  $KBrF_4$  type.

ESR experiments have been performed from 4.2 to 293 K. The spectra show palladium +III to be in a low-spin configuration  $^2E_g(t_{2g}^6 e_g^1)$  associated with an important Jahn-Teller effect. The g values:  $g_{\parallel} = 2.0504$ ,  $g_{\perp} = 2.263$  are consistent with an important distortion of the coordination polyhedron of PdIII.