

EJ 12 Wednesday 9:00 a.m. Supplementary Program

Modification of the Electronic Properties of  $(\text{SN})_x$  by Halogens\*

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We report the first successful modification of the electronic properties of the polymeric metal  $(\text{SN})_x$  by chemical reaction with  $\text{Br}_2$ . We have also successfully reacted  $(\text{SN})_x$  films and crystals with  $\text{I}_2$  and  $\text{ICl}$ .<sup>1</sup> Independently Bernard et al.<sup>2</sup> have recently reported reaction of  $(\text{SN})_x$  with  $\text{Br}_2$ . The composition of the blue/black fibrous crystals is found to be  $(\text{SNBr}_{0.4})_x$ . Despite 50% volume expansion  $\perp$  to the b-axis the lattice parameters are found to be unchanged from  $(\text{SN})_x$ . Diffuse superlattice lines are observed with a period  $2b$ . The b-axis conductivity  $\sigma_{\perp 300\text{K}} = 2 \times 10^4 \Omega^{-1} \text{cm}^{-1}$  is an order of magnitude greater than in  $(\text{SN})_x$  and increases by an order of magnitude upon cooling to 4K. Compared to  $(\text{SN})_x$ ,  $\sigma_{\perp 300\text{K}}$  also increases five to eightfold and the thermoelectric power (negative in  $(\text{SN})_x$ ) takes on small positive values and decreases monotonically with decreasing temperature. Optical reflectivity shows the plasma edge shifted to the red, however, Drude-Lorentz analysis shows that  $\omega_p$  is essentially unchanged from that of  $(\text{SN})_x$ , the red shift being accounted for by an increased dielectric constant. The crystals superconduct with  $T_c \approx 0.3\text{K}$ . The dramatic changes in the transport properties are attributed primarily to an increase in scattering time.

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<sup>1</sup>G. B. Street, W. D. Gill, R. H. Geiss, R. L. Greene and J. J. Mayerle, to be published.

<sup>2</sup>C. Bernard, A. Herold, M. Lelaurain and G. Robert, C. R. Acad. Sci. Paris, C, 283, 625 (1976).

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