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

Modification of the Electronic Properties of (SN), by Halogens*

W. D. Gill, G. B. Street, R. H. Geiss, R. L. Greene, P. M. Grant J. J. Mayerle and W. Bludau

IBM Research Laboratory 5600 Cottle Road San Jose, CA 95193

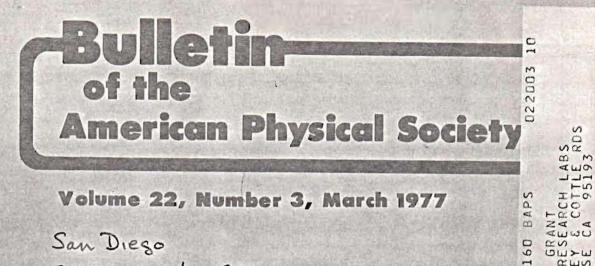
We report the first successful modification of the electronic properties of the polymeric metal (SN), by chemical reaction with Br2. We have also successfully reacted (SN) films and crystals with I and IC1. Independently Bernard et al.² have recently reported reaction of (SN), with Br2. The composition of the blue/black fibrous crystals is found to be $(SNBr_{0,4})_x$. Despite 50% volume expansion \perp to the b-axis the lattice parameters are found to be unchanged from (SN) . Diffuse superlattice lines are observed with a period 2b. The b-axis conductivity $\sigma_{//300K}=2 \times 10^4 \ \Omega^{-1} \ cm^{-1}$ is an order of magnitude greater than in (SN), and increases by an order of magnitude upon cooling to 4K. Compared to (SN)_x, $\sigma_{\perp 300K}$ also increases five to eightfold and the thermoelectric power (negative in $(SN)_x$) 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 ω_{n} is essentially unchanged from that of (SN), the red shift being accounted for by an increased dielectric constant. The crystals superconduct with $T_c \simeq 0.3K$. The dramatic changes in the transport properties are attributed primarily to an increase in scattering time.

*Research supported in part by ONR Contract N00014-76-C-0658.

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

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

20



BAPS

66160

I BAUL M G

101- 118N -101

Volume 22, Number 3, March 1977 San Diego 21-24 March 1977

Published for the American Physical Society the American Institute of Physics by

2.5