

Abstract Submitted  
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**Bulk superconductivity in novel  $\text{Bi}_4\text{O}_4\text{S}_3$  compound** SHIVA KUMAR SINGH<sup>1, 2</sup>, M. HUSAIN<sup>2, 2</sup>, S. PATNAIK<sup>3, 3</sup>, V. P. S. AWANA, 1 — We report here synthesis and superconductivity in  $\text{BiS}_2$  based newly discovered  $\text{Bi}_4\text{O}_4\text{S}_3$  compound. The compound is synthesized through vacuum encapsulation technique and is contaminated with small impurities of  $\text{Bi}_2\text{S}_3$  and Bi. The compound is crystallized in tetragonal I4/mmm space group. Bulk superconductivity with superconducting transition temperature ( $T_C$ ) of 4.4 K is confirmed by AC, DC magnetization and resistivity measurements. For further confirmation of intrinsic bulk superconductivity, we have heat treated Bi at same temperature and in similar condition. Bi is crystallized in rhombohedral R-3m space group (impurity phase Bi is also indexed in same space group) and is non-superconducting. This excludes any possibility of impurity driven superconductivity in the  $\text{Bi}_4\text{O}_4\text{S}_3$  compound. Isothermal magnetization (M-H) measurements indicated closed loops with clear signatures of flux pinning and irreversible behavior. The magneto-transport  $\rho(T, H)$  measurements showed a resistive broadening and decrease in  $T_C$  ( $\rho = 0$ ) to lower temperatures with increasing magnetic field. The extrapolated upper critical field  $H_{c2}(0)$  is around 31 kOe. In the normal state the  $\rho \sim T^2$  is not indicated.

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