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Strong Coupling S-wave Superconductivity in $Bi_4O_4S_3$ - SHRUTI, PANKAJ SRIVASTAVA, SATYABRATA PATNAIK, School of Physical Sciences, Jawaharlal Nehru University, New Delhi, India — We investigate the superconducting properties and pairing symmetry in recently discovered $Bi_4O_4S_3$ superconductor. A series of $Bi_6O_4S_4(SO_4)_{1-x}$ samples were synthesized by solid-state reaction. The optimally doped sample $Bi_4O_4S_3$ which is 50% SO_4 deficient shows maximum T_c of 5.3K as confirmed by resistivity and magnetization measurement. The upper critical field at zero temperature is found to be $\sim$ 2.75 T and Ginzburg Landau coherence length is estimated to be $\sim$ 110Å. Hall measurement confirmed the dominant role played by the electrons with charge carrier density of 4.405x10^{19} cm^{-3} at 10 K. The Sommerfeld constant γ is calculated to be 1.113 mJ/K^2mol. Superconducting pairing symmetry and superconducting gap was studied from penetration depth measurement using tunnel diode oscillator technique. It is shown that $Bi_4O_4S_3$ is a strong coupling s-wave type superconductor with fully developed gap. Below T_c, superfluid density is best fitted with single gap s wave model with zero-temperature value of the superconducting energy gap Δ_0= 1.54 meV, corresponding to the ratio $2\Delta_0/k_BT_c$=7.2 which is much higher than the BCS value of 3.53.

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