

# Structural characterization and dielectric properties of the solid solutions

## AgPb(Sb,Bi)S<sub>3</sub>

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The new solid solutions AgPbSb<sub>1-x</sub>Bi<sub>x</sub>S<sub>3</sub> were prepared by solid state reactions. The phases were characterized by powder X-ray diffractions (XRD), scanning electron microscopy, and thermal analysis. The XRD patterns of different members ( $x = 0.5, 0.7, 0.8,$  and  $1.0$ ) are consistent with pure phases crystallizing in the cubic PbS-type structure. The electrical characterization was carried out using ac impedance spectroscopy and dc methods. The temperature dependence of the dc conductivity shows typical semiconductor Arrhenius behavior. The impedance measurements were performed in the frequency range of 0.1 Hz to 10 MHz and at the temperature range of 15°C to 350°C. The ac conductivity conforms to Jonscher's universal power law. The frequency dependence of the dielectric permittivity follows the normal dielectric material behavior, and the relaxation is thermally activated. The frequency and temperature dependences of the electrical data are found to follow Summerfield scaling formalism.