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Molecular origin of the giant conductivity enhancement in $(Ag_2S)_x(As_2S_3)_{1-x}$ glasses[1] CHAD HOLBROOK, P. BOOLCHAND, University of Cincinnati — The solid electrolyte additive Ag_2S is found to homogeneously alloy with base As_2S_3 glass at low concentrations (x < 6 %, single: $T_g = T_g^{high} \sim$ 210C), but it rapidly segregates as a Ag-rich glass phase at medium concentrations (6% < x < 20%, bimodal : T_g^{high} and $T_g^{low} \sim$ 170C), and becomes the principal glass phase populated at higher x > 35 % (single: T_g^{low}) as revealed by modulated calorimetric measurements. The stoichiometry of the Ag-rich (T_g^{low} phase) is suggested to be near $AgAs_3S_7$ at x ∼ 25% but becomes closer to that of Smithite ($AgAsS_2$) at x > 40%, as revealed by Raman scattering. In the 9% < x < 14% composition range, one observes, in calorimetric experiments, the opening of a reversibility window, and a pronounced increase in the fractional population, R(x) of the Ag-rich glass phase, both of which correlate well with the 5-orders of magnitude increase in electrical conductivity[1,2] across this compositional interval. In the same interval molar volumes on our samples show a local plateau. These observations suggest a new interpretation of the giant electrical conductivity enhancement observed at x > 15% in the present electrolyte glass system. [1] E.A. Kazakova and Z.U.Borisova, Fiz. Khim.Stekla **6**, 424(1980).

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