

Abstract Submitted
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Elasticity and conductivity thresholds in solid electrolyte glasses¹

D. NOVITA, P. BOOLCHAND, University of Cincinnati, M. MALKI, F. FAYON, CNRS-Orleans, M. MICOULAUT, University of Paris VI — The solid electrolyte glass, AgI, possesses a low mean coordination number [1], and when alloyed in the base oxide glass, AgPO₃, steadily lowers the connectivity of the alloyed glass, (AgI)_x(AgPO₃)_{1-x}, as reflected in reduction of glass transition temperatures $T_g(x)$. Non-reversing enthalpy associated with T_g s vanish in the $0.10 < x < 0.35$ range, the reversibility window, which we identify with the Intermediate elastic phase [2]. Glasses at $x < 0.10$ belong to the Stressed-Rigid while those at $x > 0.35$ to the Floppy elastic phase. Electrical conductivity, $\sigma(x)$, reveal a mild increase near $x = 0.10$ as glasses become unstressed, and a pronounced increase near $x = 0.35$, when glasses become floppy. The correlation between $\sigma(x)$ and the elastic phases opens a new paradigm in understanding electrical transport in glasses. Chains of PO₄ tetrahedra (Q^2) present in the pristine oxide are steadily cut and eventually transformed into rings as networks become less connected with increasing x , as revealed by Raman and P³¹ NMR measurements.

[1] P. Boolchand and W.J.Bresser, Nature **410**, 1070 (2001).

[2] S.Chakravarty, D.Georgiev, P.Bootchand & M.M.Micoulant, JPCM **17**, L1-L7 (2005).

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