

# Effects of reduced dimensionality in the relaxation dynamics of ionic conductors

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## Abstract-

We report on the dispersive ionic conductivity in  $\text{Li}_{0.5-x}\text{Na}_x\text{La}_{0.5}\text{TiO}_3$  ( $0 \leq x \leq 0.5$ ), where the number of available positions for the mobile Li ions is reduced by introducing immobile Na ions. At high frequency the conductivity is power law dependent with an exponent which increases as the number of accessible neighboring sites decreases. This result is quantitatively accounted for in terms of a one-parameter statistical microscopic model. We provide experimental and theoretical evidence for the importance of reduced dimensionality resulting from the blocked pathways in slowing down the dynamics of diffusing ions.

**Index Terms-** conductivity, diffusion, transport, origin

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