

Localized nonlinear excitations in silicate layers

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Recently the subject of localized nonlinear excitations that leave fossil tracks in silicate layers [1] have received renewed attention because it was realized that the dark tracks are produced by positive charge and that also negative localized charge transport can be detected [2,3]. This discovery opens the way to understanding an intermediate mechanism for charge transport between ohmic conductivity and superconductivity, called hyperconductivity, for which also there was experimental evidence from long ago in polymers [4] and it is also presently subject of renewed experimental, theoretical and engineering interest [5]. The transport of charge by nonlinear excitations also opens the way to experimentation, which is currently underway at Sevilla University trying to detect significant changes in the extremely low conductivity of mica muscovite when nonlinear localized vibrations are excited through the interaction of alpha irradiation or plasma ions.

In the present communication a review of the present state of the theoretical and experimental research will be presented together with simple but realistic models of nonlinear excitation in silicate layers presenting the different forms of localized excitations with their energies and stability, as kinks [6] and breathers, tentatively relating them to the different observed tracks and the possible relationship with charge transport.

References

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