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Modeling glass transition and aging processes in nanocomposites and polymer thin films VICTOR PRYAMITSYN, VENKAT GANESAN, University of Texas at Austin — We use a lattice kinetic model of glass transition to study the role of confinement and the presence of nano-inclusions. We have studied freely suspended films of glass-formers and its nanocomposites with "plastifying" and "hardening" nanoparticles. Using our model we determine the thickness and nanoparticle load dependencies of the Kauzmann temperature T_0 and the fragility parameter. We found the glass transition temperature increases with the thickness of the film and the volume fraction of "hardening" nanoparticles , while T_g decreases with increase in the loading of "plastifying" nanoparticles. We found that the isothermal free volume relaxation rate of the nanocomposite thin film, usually referred as an aging, correlates with the glass transition temperature shift. We also studied the relations between our lattice model and Curro's, Kovacs and Struik's phenomenological models of free volume reduction to deduce physical insights into the mechanisms governing aging processes in thin films and nanocomposites.

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