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Influence of Filling of Polymer with Nanoparticles on Relaxation Processes and Glass Transition IVAN JOEL LOPEZ, VLADIMIR DOLIDZE, FOUAD ALIEV, Univeristy of Puerto Rico, San Juan, PR 00931 — We report the results of the investigations of the influence of filling of polymer with Aerosil nanosize particles on the glass transition and dynamics of the alpha- and the beta-relaxation processes in poly(butylmethacrylate) by dielectric spectroscopy and differential scanning calorimetry (DSC). The polymer was filled with hydrophilic and hydrophobic Aerosil particles of 12 nm diameter. Both the alpha- and the beta- relaxation processes were observed in filled polymer. However in filled polymers the characteristic frequency of the alpha-process was shifted to higher frequencies in comparison with pure bulk polymer. This suggests that the filling of the polymer with nanoparticles has resulted in the shift of its glass transition temperature T_g . This change in T_g was mainly due to the existence of a developed pore wall/solid particle-polymer interface and the difference in the dynamic behavior of the polymer in the surface layers compared to that in the bulk. This result was in agreement with DSC experiments. Variations of size of filling particles and their concentration are helpful in understanding of relaxation properties at polymer – solid interface as well as of a role of surface interactions in glass transition.

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