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# Frontal copolymerization in the presence of nano-particles

S.P. Davtyan[1], A.O. Tonoyan[1], A.Z.Varderesyan[1], S. C. Müller[2,*]

[1]State Engineering University of Armenia
Teryan Street 105, Yerevan, Armenia, E-mail: atonoyan@mail.ru
[2,*] University of Magdeburg, Institute of Experimental Physics,
Universitätsplatz 2, D-39106 Magdeburg, Germany
Tel.( +49)391-6718936; E-mail: stefan.mueller@ovgu.de

**Abstract**

The influence of added nano-particles ($SiO_2$, $TiO_2$) on the process of frontal copolymerization (acrylamide+ methylmetacrylate, acrylamide + styrene) is investigated, and the thermo-physical properties of the obtained nano-composites are studied. Having data of the influence of the amount of nano-particles on the limiting temperature of thermal waves, on the front velocity, and on the law of additive changes concerning the relative thermal capacities of the obtained nano-composites, conclusions can be drawn regarding the positive influence of thermal waves on the process of nano-particle deagglomeration. It is shown, that the dependence of this relative thermal capacity on the amount of nano-particles is non-additive. An analysis of these results shows, that the characteristic sizes of the rigid amorphous fraction formed on the nano-particle surface are characterized not only by the nature and size of the nano-particles, but also by polymeric binding. The thickness of the rigid amorphous fraction is independent of the quantity of nano-additives.

**Keywords:** nano-composites, thermal waves, thermal capacity, glass transition, rigid amorphous fraction