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Theory of Holographic Formation in Multicomponent Photopolymer-Based Nanocomposites*

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The derivation of the three-component (monomer, chemically neutral component, and polymer) photopolymerization model from general thermodynamic considerations is presented. This model, together with another previously published one, are subject to a numerical solution for the case of a two-component one-dimensional diffusion (polymer component being steady). The divergence of results of work for both models was compared based on the average speed of the root-mean-square deviation in the spatial spectrum domain for relative volume fraction functions for all three components. Such a comparison was performed for 81 pairs of initial relative amount of neutral component and effective diffusion coefficient. The results of the work may serve as a good guide for the choice of parameters of experiments, which are aimed to verify the correctness of the modified theory.

Keywords: photopolymerization, photoformer, holographic grating, multicomponent diffusion, polymer, holography.