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Investigation of the Effect of Plasticization Temperature on Polymer Thin Film Stability through Spin Coating Process

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Abstract : We report a technique to control chain conformation during the plasticization process to achieve homogeneous and stable thin films, which allows to reduce post-process annealing times along with enhanced properties like controlled irreversible adsorbed layer (Guiselin brushes) formation. In this study, spin coating temperature was considered as a parameter; hence, all equipment, including the spin coater, substrate, vials, and the solution, was kept inside the same heated fume hood where solution was spin-coated after the temperature was stabilized at a desired value. AFM and SEM results revealed severe difference for solid and air interface between ambient and temperature-controlled samples, which suggest that enthalpic contribution dynamically helps to control film stability in a way where chain entanglements and conformational restrictions are avoided before film growing and allowing to control grafting density through spin coating temperature. The adsorbed layer was also characterized with SEM and Raman-spectroscopy technique right after seeding the adsorbed layer with gold nanoparticles. Stabilized gold nanoparticles and their surface distribution manifest the existence of a controllable polymer brush structure. Acknowledgments: This study was funded by Erciyes University Scientific Research Projects (BAP) Funding(Project ID:10058)

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