

Abstract Submitted  
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**Studies on Phase Separation in a-PMMA/PEG Gels<sup>1</sup>** XIAOLIANG WANG, LIANG LI, DONGSHAN ZHOU, GI XUE, Department of Polymer Science and Engineering, Nanjing University — Stereo-irregular atactic poly(methyl methacrylate) (*a*-PMMA) is known incapable of forming gels in common solvents, irrespective of the solvent quality. However, we recently found a rigid opaque thermal-reversible *a*-PMMA gel in the solvent of the polyethyl glycol oligomer (PEG) (the PEG molecule mass differ from 400 to 4000 were used). FT-IR, dynamic mechanical temperature analysis and Solid state NMR measurements were used to study the gel properties and gelation mechanism. The *in situ* IR studies in *a*-PMMA/PEG gel suggested that some *a*-PMMA segments were in the aggregated state in solution, which became a node in the solution. With decreasing temperature, the fraction of aggregated *a*-PMMA in solution increases, resulting in the formation of physical network finally. Spin diffusion was used to determine the size ( $\xi$ ) of domains in the gels. We found that, *a*-PMMA/PEG4000 was miscible ( $\xi \sim 9\text{nm}$ ), while *a*-PMMA/PEG1000 was micro phase separated ( $\xi \sim 57\text{nm}$ ) and *a*-PMMA/PEG400 was macro phase separated ( $\xi > 300\text{nm}$ ). The *a*-PMMA self-aggregation was attributed to the depletion interaction that becomes important in the case of middle-sized solvents.

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