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Spectroscopic Analysis of Amorphous Fluorinated Polymers
YUNING YANG, Department of Physics, University of Massachusetts, Amherst, SHAW L. HSU, Polymer Science and Engineering, University of Massachusetts, Amherst — Polarized Raman spectra have been obtained for poly (vinylidene fluoride) (PVDF). The results encouraged us to revisit the Raman band assignment, especially within the conformational sensitive region (400 cm^{-1} $\sim$ 1100 cm^{-1}). The potential energy distribution (PED) for Raman bands within this region is recalculated. The results are supported by the experimental polarized Raman study. Based on the calculated PED, spectroscopic features (band ratio between 648 cm^{-1} and 550 cm^{-1}) are associated with the distribution of rotational isomeric states. Furthermore, a spectroscopic simulation of the amorphous phase of PVDF is carried out and proven successful by comparison to experimental amorphous spectra. Based on the simulation, the amorphous Raman bands are assigned to different conformational sequences (*tttt*, *tttg*, *tgtg'*). This makes the quantitative analysis of the amorphous phase plausible. Amorphous PVDF chains in different solvents are analyzed by this spectroscopic method and may be used to explain solvent-induced polymorphism of PVDF.

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