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Type: **Invited talk (30 min + 5 min discussion)**

Dynamics of polymer and oleic acid in one component nanocomposites (OCNC)

Monday, 4 December 2023 13:05 (35 minutes)

OCNC made from polymer grafted nanoparticles are an advanced class of nanocomposites (NC). It circumvent the problem of segregation, commonly encountered in conventional NC. Grafting polymer chains on nanoparticles is an efficient method for synthesizing NC free from phase separation. The dynamics of grafted polymer chain is significantly influenced by the molecular weight (MW), temperature and the grafting density. We used a combination of QENS and BDS. We observe a MW dependent dynamics in grafted polymers. For lower MW, the dynamics of grafted polymer is decelerated as compared to the pure polymer. On the other hand, for higher MW, the dynamics of grafted chain is faster. We invoke a detailed analysis method using distribution of relaxation times to fit the data which unearths the presence of both faster and slower segments in OCNC. Our analysis reveals that the apparently different effect of grafting on the segmental dynamics of different MW grafted polymers is a consequence of different contributions from faster and slower segments. Broadly, we study the effects of grafting in different parts of the tethered chain using neutrons and other techniques. We studied the dynamics of oleic acid in ungrafted and grafted state without any solvent using simplistic, yet physical, analytical approaches [3].

[1] Sharma, A. et al. Phys. Rev. Mater. 2022, 6 (1), L012601

[2] Sharma, A. et al. Macromolecules 2023, 56 (13), 4952–4965

[3] Sharma, A. et al. J. Chem. Phys. 2022, 150, 30401

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