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**Topic of research: Role of Nanoparticles in protein aggregation related diseases**

### **Findings**

In this study, different ratios of MMT based POPD (Poly-orthophenylenediamine) nanocomposites (NCs) were synthesized successfully via sonochemical intercalation. Further, they were characterized for their surface charges, intercalation, size, and morphology by using spectroscopic and microscopic techniques. Human Serum Albumin (HSA) and Human Lysozyme (HL) were used as the model proteins to investigate the effect of nanoclays and their NCs as aggregation Inhibitor. Further, the different types of nanoclays and synthesized POPD/MMT NCs were used to inhibit the process of HSA and HL aggregation. Results demonstrated that all the nanoclays and NCs inhibited the DTT-induced protein aggregation efficiently. However, bentonite and MMT K-10 among all nanoclays and MMT: POPD NCs among all NCs were progressively intense and potent as they slowed down the nucleation stage which can be perceived using several biophysical techniques. However, the other nanoclays and other NCs were also found to be effective but they reduced the aggregation at higher concentrations. In the presence of nanoclays and NCs, both the proteins formed the fibrillar type of aggregates showed a reduction in beta-sheets as observed from the CD results. As HSA and HL aggregation leads to the disease pathogenesis, the prevention of its aggregation will be important for human health. This study showed that the progression of the protein aggregation was completely inhibited in the presence of nanoclays and NCs. Hence, they can be used as an artificial chaperone. This might be helpful to find a cure for the treatment of non-neuropathic and neurodegenerative diseases which open up the new gateways for further research in the future.