

## **Halloysite Nanoclays, a Safe Alternative to CNT's**

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Halloysite clays are naturally occurring silicate nanotubules formed by geological processes. Halloysite nanotubes are recognised as a valuable raw material for use with plastics because of their unique structural and chemical properties. Halloysite can be used in nanocomposites to provide enhanced mechanical and fire retardant properties and potentially for the self-healing of polymers, this functionality being provided through the loading of healing agents into the tubules. This presentation covers the use of halloysite in nylon 6 and PET, including • Loading mechanism into halloysite lumens • Dispersion behavior of halloysite in nanocomposites • Chemical and thermal analysis of nanocomposites DMTA was used to evaluate the effect of different halloysite loadings on the mechanical properties of specific polymers. The storage modulus (in tensile test mode) was found to vary at different mixing ratios. DSC results showed halloysite acted as a nucleating agent in both PA6 and PET, the presence of halloysite significantly increasing the overall crystallization rate and the level of crystal formation. SEM/EDX confirmed the excellent distribution of nanotubules in the polymer matrix, this was attributed to the unique structure/charge properties of halloysite. When the tubules were loaded with sodium ascorbate, FTIR results suggested that the active compound was present in lumens rather than on the surface of tubules. In summary, a successful loading system was developed for active compounds, and halloysite based PET and PA6 nanocomposites were produced. The clear changes in mechanical/crystallization properties were demonstrated and halloysite dispersion in polymers verified. Evaluation of the potential of halloysite as a carrier for self-healing agents and other active compounds is continuing, as is research into novel nanocomposites with superior mechanical properties.