Synthesis of a Bioplastic-based Drug Delivery System by Selective Etching of Halloysite Nanotubes

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Due to the low bioavailability and water insolubility of many drugs, many researchers have been trying to develop new drug delivery systems (DDS). due to their abundance in nature, low cost, and low toxicity, halloysite nanotubes (HNT) are promising drug carriers for these DDS. In this research, HNT were selectively etched by acid treatment to enhance their loading capacity. The inner diameter of HNT was increased by around 20nm. PXRD scans show that HNT maintained its structural integrity. Ibuprofen (IBU) was loaded into the HNT by magnetic stirring. PXRD show that IBU was also completely amorphized in the process. Furthermore, FTIR shows that he IBU was successfully loaded by hydrogen bonding. The loaded HNT were then added to a bioplastic powder prepared separately and hot pressed to obtain films of the DDS. Release rate without starch film was significantly more sustainable compared to the release of IBU found in the literature. Release rate with starch film was sustainable and bi-phasic, likely because starch required time to be saturated with the solvent.

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