Single Molecule Sequencing of Chitopolymers

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Chitopolymers are among the most abundant biomolecules on earth. Understanding their structure is necessary for studying their biological functions. The characterisation of chitopolymers is difficult due to their heterogeneous nature. To bypass this obstacle, we observe chitopolymers on the single molecule level by combining electrospray ion beam deposition (ESIBD) and scanning tunneling microscopy (STM). ESIBD allows for the deposition of intact molecules on a surface followed by STM to image the individual molecules with sub-molecular resolution. Direct imaging allows individual chitopolymers to be sequenced and further corroborated by *ab initio* calculations. By identifying the sequences of chemoenzymatically-prepared HTDA (heterogeneously deacetylated) chitopolymers, we uncover how these enzymes modify the chitopolymers at the sequence level. Future work will focus on biologically-sourced chitopolymers to reveal the biochemical pathways involving chitin/chitosan in biological systems.