

Structural characterization of alpha-lactalbumin nanotubes

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Nanotubes are formed by self-assembly of the milk protein α -lactalbumin, after partial hydrolysis by a protease from *Bacillus licheniformis*. These unique nanotubes are formed only in the presence of an appropriate cation at neutral pH. The α -lactalbumin nanotube is a heterogeneous self-assembled structure comprising diverse hydrolysis products of α -lactalbumin with molar masses around 11 kDa. On the basis of the mass spectrometry, circular dichroism and cryo-electron microscopy results presented here, and previous atomic force microscopy and scattering results, the α -lactalbumin nanotube is proposed to comprise dimeric building blocks, which self-assemble into a 10-start right-handed helix via β -sheet stacking. The self-assembled protein nanotubes presented here can serve as a model for artificial nanotubes or possibly be used in nanotechnological applications.

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