

# Formation control and morphology conversion of collagen nanofibers by torsional flows of vortex

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Natural nanofibers attract much attentions in the field of nanocosmetics. In this study, we have studied formation controls and structural transformations of the bionanofibers such as collagen and amyloid fibrils by torsional flows of vortex. Linear dichroism (LD) spectroscopy allowed spectroscopic visualization of the flow-induced alignment of the nanofibers in the solution. Although collagen showed poor LD response, insulin amyloid fibril provided strong LD response upon stirring of the solutions. We found that insulin molecules self-assemble to form a nanofiber that enables flow-induced alignment in the vortex flows, but form fibrous aggregates that show no alignment without stirring of the solution. The results obtained in this study suggest the importance of fluid flows in the process of protein fibrillations.