

Natural–Synthetic Hybrid Protein Materials: Preparation, Characterization, and Biomedical Applications

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Traditional textiles are primarily composed of proteins, making production scraps a valuable yet underutilized source of protein-based materials. In this presentation, we explore the use of keratin from wool, and fibroin and sericin from Bombyx mori silk, to develop innovative, stimuli-responsive hybrid materials. Two distinct strategies for combining poly(N-isopropylacrylamide) (PNIPAAm) with these proteins are presented. The first involves the synthesis of the acrylic polymer in the presence of proteins, while the second relies on a simple mixing approach, where preformed polymer microgels are combined with the proteins. The resulting hybrid materials were thoroughly characterized to assess their structural features and thermoresponsive behavior. Finally, their potential applications as drug carriers and as substrates for cell growth were evaluated.