Thermal Graphitization of Protein Fibers

진형준†, 윤영수[1], 조세연
인하대학교 고분자공학과; [1]강원대학교 에너지화학공학과
(hjjin@inha.ac.kr†)

The pyrolytic behavior is distinct from those of polymeric materials consisting of linear main chains, which are almost decomposed and vaporized as flue gases by heating. A β-sheet-rich protein, which is a linear polymer composed of peptide main chains, is a promising carbon precursor for state-of-the-art technologies. These exceptional pyrolytic behaviors of linear peptide main chains are not completely understood, but the thermo-denaturalization of proteins has been suggested. This study reports the pyrolytic process and development of a sp^2 conjugated hexagon structure from β-sheet-rich proteins by heating. The β-sheet secondary structure plays an important role in the development of a highly stable and large sp^2 conjugated hexagonal structure at the very low temperature of 350 ºC. These carbon materials were advanced into ordered graphitic structures with increasing heat-treatment temperature to 2800 ºC.