Enhancement of mechanical properties of recombinant silk-like protein derived from sea anemone

양윤정, 정호균, 최유성, 정두엽, 차형준*
POSTECH
(hjcha@postech.ac.kr*)

Under certain stimulus, sea anemone stretches and shrinks its body rapidly. We assumed that silk or elastin-like protein is involved in this action; moreover, unique repetition of decamer, mainly consists of glycine and proline, was identified. Through immunohistochemistry, we proved that the unique repeated sequence is distributed along with skin of anemone, especially at its tentacles. This discovery led to a successful expression of anemone's silk-like protein (30 kDa) in Escherichia coli; then, the protein is spun by wet spinning, and performed tensile test to examine mechanical properties. Its properties, in terms of strength and extensibility, exceeded those of elastin or resilin. To improve its properties, such as strength, extensibility, stiffness and toughness, we constructed 60KDa of silk-like protein by fusing two of 30KDa repeated sequence. Through this approach, the strength of protein became competitive against synthetic rubber. The 60 kDa silk-like protein also showedoutperforming stiffness to the previous 30 kDa protein and tendon collagen. In addition, its extensibility was roughly analogous to Kevlar's, a synthetic fiber.