

## CHARACTERIZATION OF SILK FIBROIN SOLUTIONS

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### ABSTRACT

Silk fibroin has attracted more and more attention due to its high mechanical properties, great biocompatibility with living tissues, low biodegradability and minimal inflammatory reaction. It can be isolated from silk fibers, which are produced by cultivated *Bombyx mori* silkworm. Silk fibers mainly consist of two proteins, sericin and fibroin. Depending on the cocoons strain, the fibroin content is 66.5–73.5 wt. % and the sericin content is 26.5–33.5 wt. %. The silk fibroin fibers consist of two proteins: a light chain and heavy chain which are linked by a single disulfide bond and these proteins are coated with sericin. The isoelectric point of fibroin varies in the range pH 3.6–5.2, depending on the solution preparation conditions. Native fibroin can be solubilized and regenerated in aqueous solution, then further processed into sponges, films, hydrogels and nanoscale electrospun non-woven mats. Also, due to the amphiphilic character and surface activity, silk fibroin can produce physically stable oil/water emulsions. The aim of this paper was preparation of aqueous fibroin solution and its characterization. An aqueous solution of silk fibroin was prepared from silkworm cocoons, which were previously treated to remove sericin. Fibroin was dissolved in 9.3M LiBr and then dialyzed against water. The isoelectric point of fibroin was determined by measuring the zeta-potential and turbidity of silk fibroin solution at different pH values. Intrinsic viscosity of the prepared solution was determined with glass capillary viscometer in the temperature range from 10 to 70°C. In addition, according to the flow times of the solution, the fibroin solution was found to be stable for up to three weeks if stored in the refrigerator. Surface tension of the fibroin solutions with different fibroin concentrations was also determined.

*Keywords: silk fibroin, silk proteins, isoelectric point, surface tension, viscosity.*