Fine Structural Characteristics of the Silk-based Film Scaffolds for Derived from the Golden Orb-web Spider *Trichonephila clavata*

Yan SUN[1], Bon-Jin KU[1] , Jae-Kyung KIM[2] and Myung-Jin MOON[1]

[1]Department of Biological Sciences, Dankook University, Cheonan, Korea

[2]Department of Biomedical Laboratory Science, Dankook University, Cheonan, Korea

ABSTRACT

- Compared with other biopolymers, spider silk can significantly reduce inflammation and serve as a scaffold for cell culture enable to growth of different cell types.
- In this experiment, the silk solution of the major ampullate gland in the orb-web spider *Trichonephila clavata* were made into a silk fibroin film and it was compared with the cocoon of silkworm *Bombyx mori*.
- The cytocompatibility and cytotoxicity of silk fibroin films were also determined by LDH and WST-8 assays.
- The β-sheet content of the spider silk film is higher, and it is less soluble in water. The surface of the spider silk film is relatively rough, so the cell adhesion is strong.
- Therefore, the film has no cytotoxicity and supports the growth of A549 cells. Experiments have shown that the spider silk film has good stability in liquid solvent, no cytotoxicity and good cytocompatibility.
- These can improve the desirability of spider silk materials in in vitro cell culture and regeneration bioengineering.

RESULTS

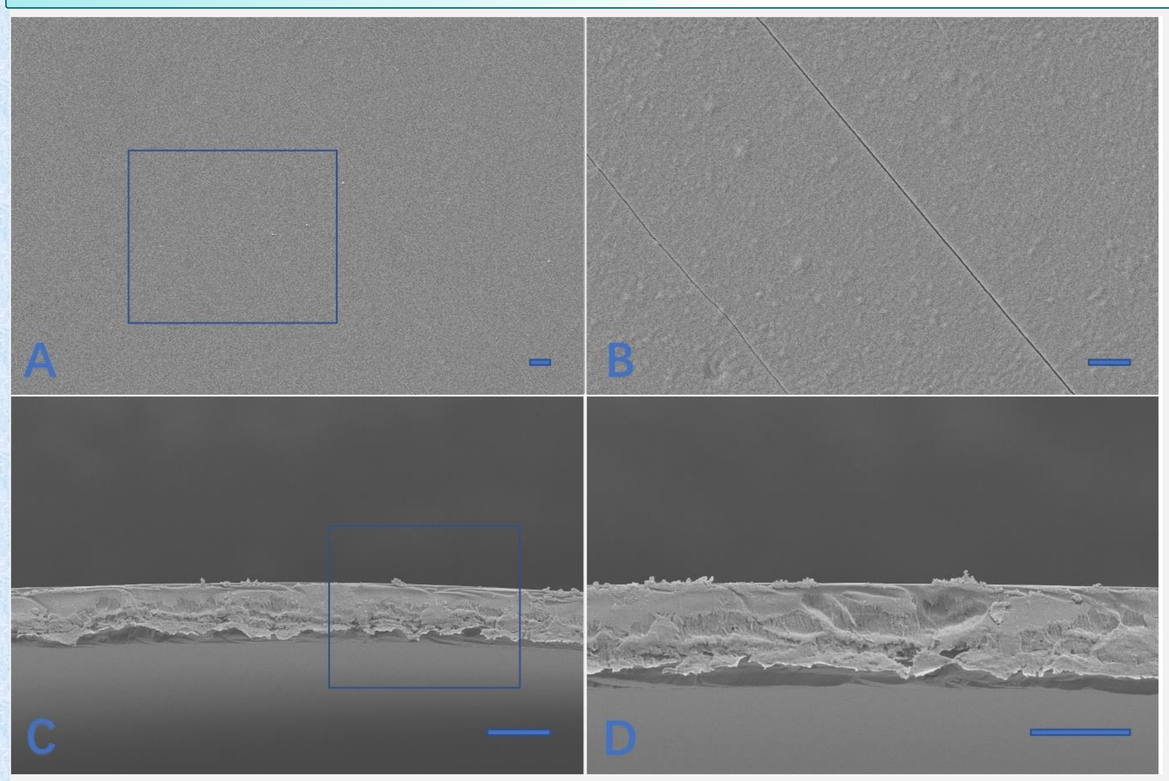


Figure 1. Scanning electron micrographs of the silkworm film scaffold. A, B: The surface of the silk fibroin film with same interval partitions**. C, D:** The cross-sectional structure of the film. Scale bars indicate 1 μm (B), 2 μm (A) and 10 μm (C, D).

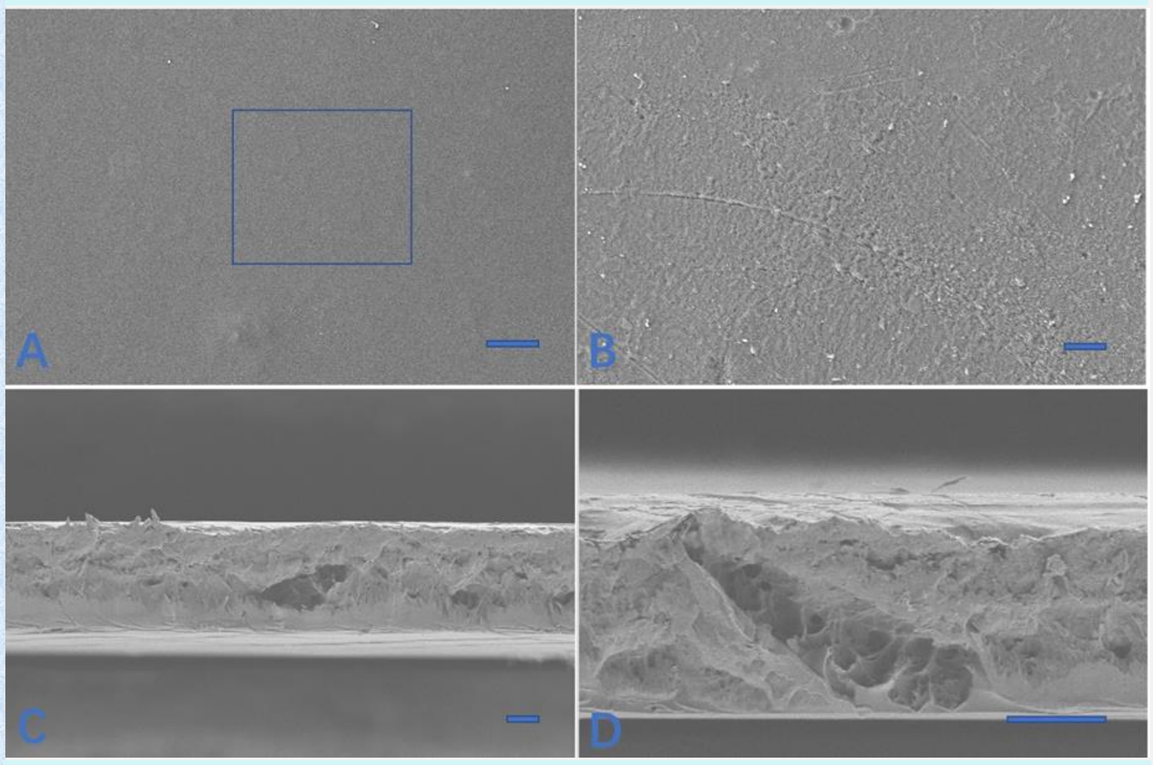
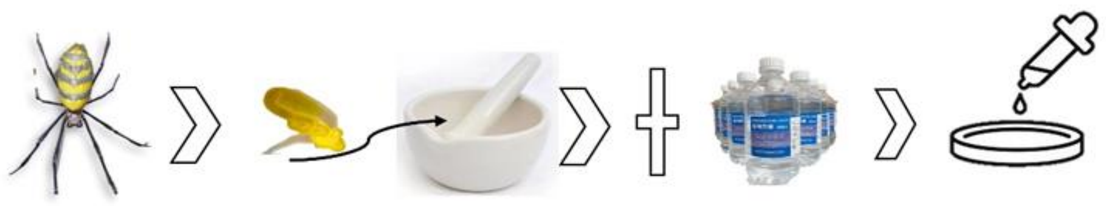


Figure 2. Scanning electron micrographs of the spider silk film scaffold. A, B are the surface structure of the mixed film of spider silk and silk. **C,D:** the cross-sectional structure of the film. Scale bars indicates 1 μm (B) ; 5 μm (A); 10 μm (C,D).

MATERIALS & METHODS



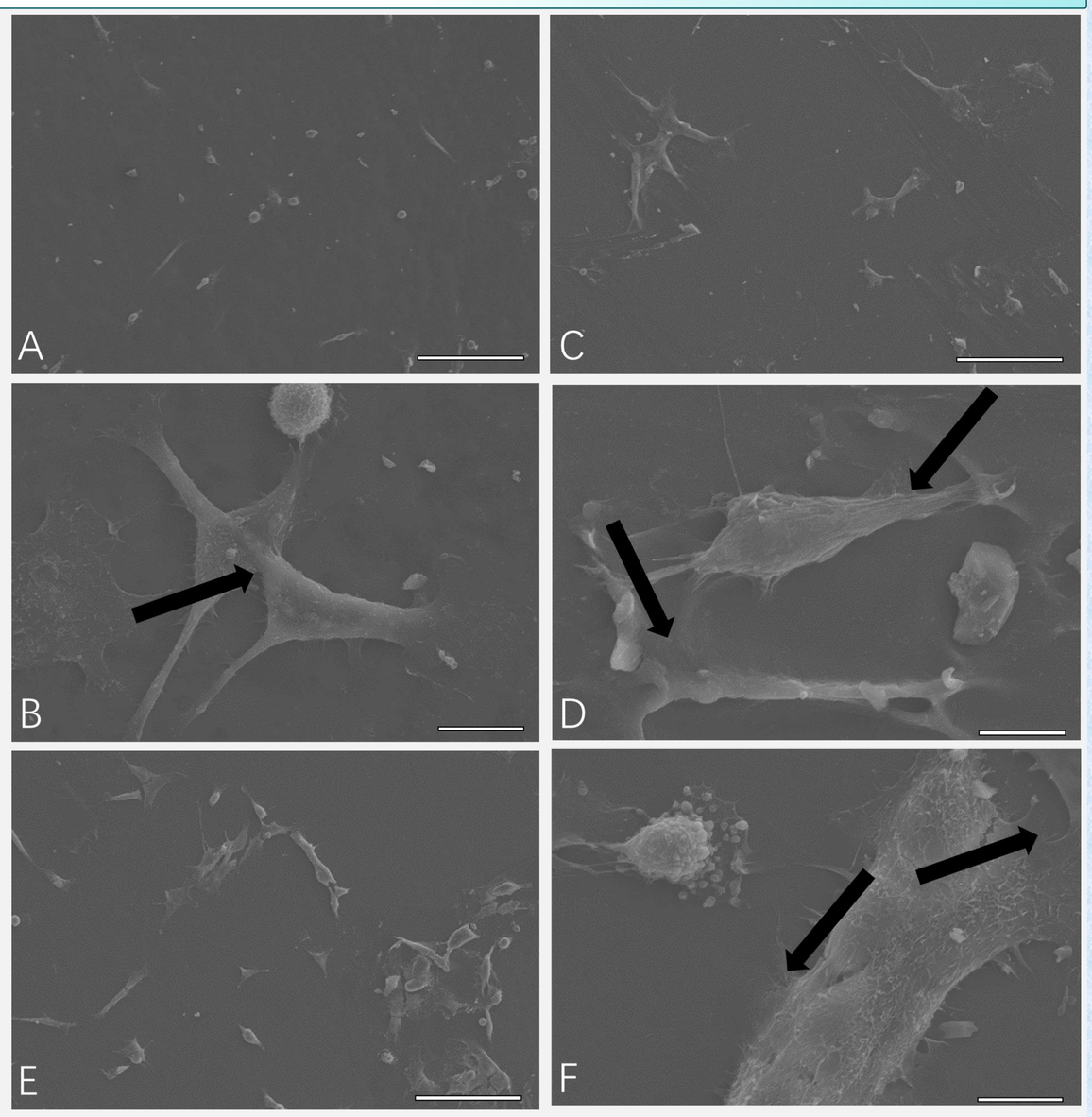
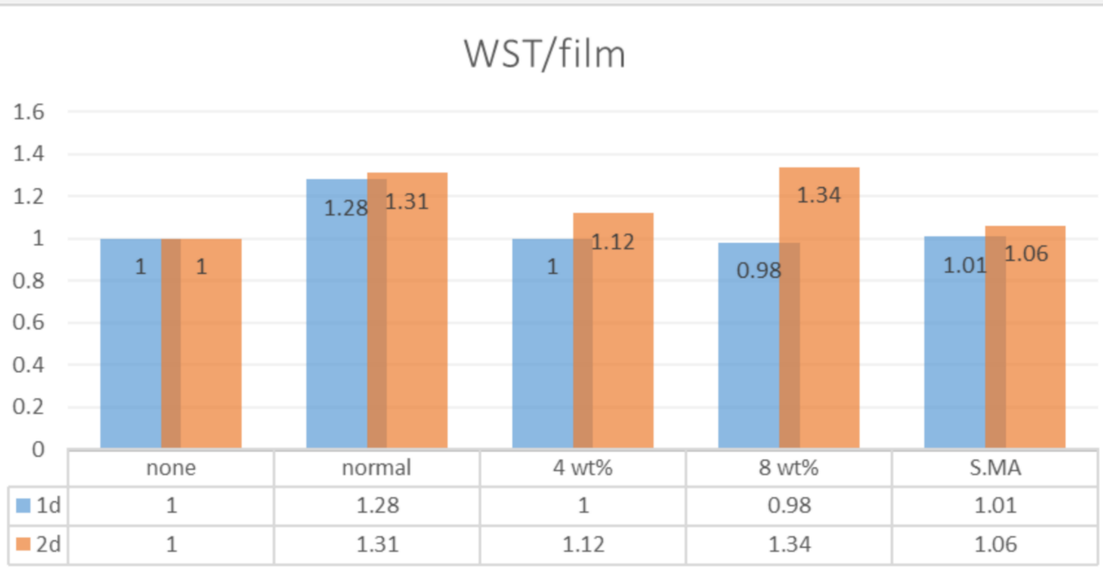


Figure 3. Scanning electron micrographs of A549 cells lin adhering to spider silk film scaffold. A, B : The cells adhere to the film for 1 day. **C, D:** The cells adhere to the film for 3 days**. E,F:** The cells adhere to the film for 7 days. Black arrows indicate the junction of cells. Scale bars indicates 10 μm (D,F); 100 μm (A-C,E).



	none	normal	4 wt%	8 wt%	S.MA
1d	1	1.28	1	0.98	1.01
2d	1	1.31	1.12	1.34	1.06

Figure 4. The changes in WST after A549 cells were cultured in different films for 24H and 48H. Normal: L929 cells in RPMI 1640 cell culture medium. None: RPMI 1640 cell culture medium.

Dr. & Prof. Moon, Myung-Jin

Tel: +82-41-550-3445 Fax: +82-41-550-3409 E-mail: moonmj@dankook.ac.kr