

NT-P008

Enhanced thermomechanical properties of poly(ethylene oxide) and functionalized bacterial cellulose nanowhiskers composite nanofibers

윤옥자

중앙대학교

Poly(ethylene oxide) (PEO)/functionalized bacterial cellulose nanowhiskers (f-BCNW) (0.1 wt%) composite nanofibers were fabricated by electrospinning process and the thermomechanical properties were significantly enhanced more than the PEO and PEO/bacterial cellulose nanowhiskers (BCNW) (0.1 wt%) composite nanofibers. The functionalization of BCNW (f-BCNW) was performed by microwave plasma treatment for effects of nitrogen functionalization of chemically-driven BCNW. The N-containing functional groups of f-BCNW enhanced chemical bonding between the hydroxyl groups of the polymer chains in the PEO matrix and diameter size of PEO/f-BCNW (0.1 wt%) composite nanofibers were decreased more than PEO and PEO/BCNW (0.1 wt%) composite nanofibers on the same concentration. The strong interfacial interactions between the f-BCNW nanofillers and polymer matrix were improved the thermomechanical properties such as crystallization temperature, weight loss and glass transition temperature (T_g) compared to PEO and PEO/BCNW composites nanofibers. The results demonstrated that N₂ plasma treatment of BCNW is very useful in improving thermal stability for bio-applications.

References

1. E. E. Brown and M.-P. G. Laborie, *Biomacromolecules* 8, 3074-81 (2007)
2. D. J. Park, Y. Choi, S. Heo, S. Y. Cho, H-J Jin, *Journal of nanoscience and nanotechnology* 12, 6139-44 (2012)
3. C. Zhou, R. Chu, R. Wu, Q. Wu, *Biomacromolecules* 12, 2617-25 (2011)

Acknowledgments

This research was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) under the auspices of the Ministry of Education (Grant No. 2009- 0093817 and 2015R1C1A2A01056280)

Keywords: Bacterial cellulose nanowhiskers, Composite nanofibers, Poly(ethylene oxide), Thermomechanical properties