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CELLULOSE-BASED MATERIALS –
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Helical Fibers via Evaporation-Driven Self-Assembly of Surface-Acylated Cellulose Nanowhiskers

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Abstract

Many natural materials have helical or twisting shapes. Herein, we show the formation of helical fibers with the lengths of micrometers by the evaporation-driven self-assembly on silicon wafers of functionalized cellulose nanowhiskers (CNWs) with surface-attached acyl chains. The self-assembly process and the final helical structures were affected by parameters including the wettability of substrates, dispersing solvents, the amount of 10-undecenoyl groups, the crystallinity, the dimension of CNWs, and the length of acyl chains. In particular, surface-acylated CNWs with a certain amount of 10-undecenoyl groups (ca. 3.52 mmol/g), an appropriate crystallinity (ca. 40%), a length of about 135 nm, and a diameter of around 4 nm, preferentially self-assembled into explicit left-handed helical fibers from their THF suspensions on wafers. Thus, we showed novel particular self-assembly behaviours of surface-acylated CNWs, and we expanded the materials spectrum for the construction of helical structures.

References

1 Liu, H.; Pang, B.; Garces, R.; Dervisoglu, R.; Chen, L.; Andreas, L.; Zhang, K.: Helical Fibers via Evaporation-Driven Self-Assembly of Surface-Acylated Cellulose Nanowhiskers. Angew. Chem., Int. Ed. **57** (2018), 16323-16328.

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Biography

Huan Liu received her BE (2013) and MS degree (2016) from Dalian Polytechnic University. She is currently a PhD candidate at the department of Wood Technology and Wood-based Composites, Georg-August-University of Goettingen under the supervision of Prof. Dr. Kai Zhang. Her research mainly focuses on the self-assembly of cellulose nanowhiskers.