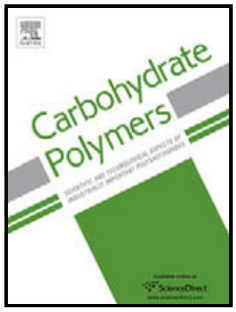

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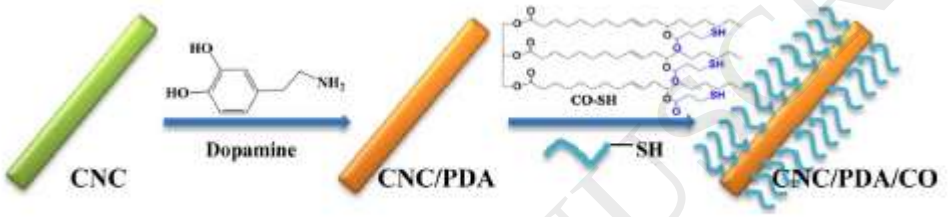
Bio-inspired hydrophobic modification of cellulose nanocrystals with castor oil

Qianqian Shang*, Chengguo Liu, Yun Hu, Puyou Jia, Lihong Hu, Yonghong Zhou*

Institute of Chemical Industry of Forest Products CAF, Nanjing 210042, Jiangsu Province, China

***Corresponding author:**
Tel (Fax): +86-02585482520
E-mail: shangqianqian@icifp.cn
yhzhou@icifp.cn

GRAPHICAL ABSTRACT



Highlights

- A co-friendly approch for hydrophobic modification of CNC is proposed.
- Thiol-containing castor oil was grafted onto CNC with the assist of dopamine.
- Mophology and crystalline structure of CNC were preserved after modification.
- Hydrophobicity of modified CNC was improved with contact angle up to 95.6°.

Abstract:

This work presents an efficient and environmentally friendly approch to generate hydrophobic cellulose nanocrystals (CNC) using thiol-containing castor oil (CO-SH) as a renewable hydrophobe with the assist of bio-inspired dopamine at room temperature. The modification process included the formation of the polydopamine (PDA) buffer layer on CNC surfaces and the Michael addition reaction between the catechol moieties of PDA coating and thiol groups of CO-SH. The morphology, crystalline structure, surface chemistry, thermal stability and hydrophobicity of the modified CNC were charactered by TEM, XRD, FT-IR, solid-state ^{13}C NMR, XPS, TGA and contact angle analysis. The modified CNC preserved cellulose crystallinity,