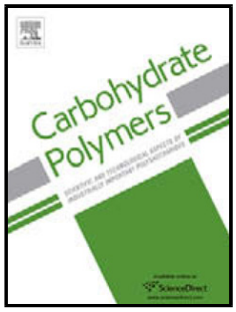

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Cellulose nanocrystal coated cotton fabric with superhydrophobicity for efficient oil/water separation

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Highlights

- Cellulose nanocrystal coated superhydrophobic cotton fabric was fabricated.
- The superhydrophobic cotton fabric showed good stability.
- The superhydrophobic cotton fabric showed high oil/water separation efficiency.
- The superhydrophobic cotton fabric is renewable and biodegradable.

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ABSTRACT

Cellulose nanocrystal (CNC) with renewability, biodegradability, and nanoscale size was used as the rough structure component instead of inorganic nanoparticles to fabricate renewable and degradable superhydrophobic cotton fabric via a dip-coating method with cured epoxidized oil resin (CESO) as the binder. The superhydrophobic cotton fabric could selectively absorb oil from oily water and could separate various oil/water mixture very efficiently with separation efficiency higher than 98%. The superhydrophobic cotton fabric showed excellent stability, making it reusable for several times without lowering separation efficiency. Moreover, the superhydrophobic cotton fabric exhibited excellent solvent and chemical resistances. Furthermore, the superhydrophobic cellulosic fabric was degradable with weight loss of 14.4 wt% after hydrolytic degradation in phosphate buffer solution (pH 7.4) at 37 °C for 10 weeks. The superhydrophobic cotton fabric may exhibit great viability as sustainable and degradable alternative to traditional nonrenewable and non-degradable superhydrophobic materials in oil/water separation.

Keywords: Superhydrophobicity; Cellulose nanocrystal; Cotton fabric; Oil/water separation; Hydrolytic degradation