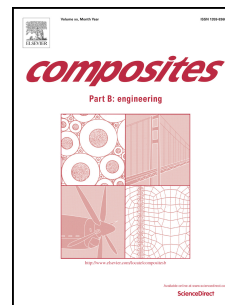


# Accepted Manuscript

Waterborne polyurethane-urea dispersion with chain extension step in homogeneous medium reinforced with cellulose nanocrystals

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1 **Waterborne polyurethane-urea dispersion with chain extension step in homogeneous medium**  
2 **reinforced with cellulose nanocrystals**

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13 **Abstract**

14 Waterborne polyurethane-urea (WBPUU) dispersions have gained attention towards environmentally-  
15 friendly synthesis routes. Differing from the conventional WBPUU synthesis route where the diamine  
16 chain extension is performed in heterogeneous medium in the surface of the already formed particles, in  
17 this case the chain extension was carried out in homogeneous medium, prior to WBPUU nanoparticles  
18 formation. Thus, stable WBPUU dispersion with small particle sizes and narrow distribution was  
19 synthesized. Furthermore, cellulose nanocrystals (CNC) were isolated for the preparation of eco-friendly  
20 nanocomposites just by mixing. Nanocomposites with different CNC contents were prepared and  
21 extensively characterized in terms of physicochemical, thermal, thermomechanical and mechanical  
22 properties, hydrophilic behavior and morphology.

23 **Keywords**

24 A. Nano-structures, B. Mechanical properties, B. Surface properties, D. Thermal analysis, Waterborne  
25 polyurethane-urea

26 **1. Introduction**

27 The use of polyurethane-ureas family is widely extended due to their versatility for a broad range of  
28 applications [1,2]. Polyurethane-ureas are composed by two segments: the soft segment (SS), a macrodiol  
29 which generally provides flexibility to the material and the hard segment (HS), formed by the isocyanate  
30 and amine type chain extender, conferring stiffness to the system [3]. Conventional polyurethane-ureas

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