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International Conference on

Nanomaterials and Nanotechnology

October 29-30, 2018 | London, UK

Cheap, green and clean high quality nanocellulose from seaweed

Mark Dorris
Edinburgh Napier University, UK

Typically, nanocellulose in the form of cellulose nanofibrils (CNF) is derived from higher plants via acid hydrolysis and/or mechanical disruption. The production processes involved limit the use of this material in high value biomedical applications. Bacterially produced nanocellulose is considered a suitable alternative for biomedical use. Both methods involve time-consuming and energy and labour-intensive processes. Edinburgh Napier University has developed a method to derive high quality CNF from the macroalgae (seaweed) species Laminaria hyperborea which is at least an order of magnitude lower in energy requirements than existing processes. The material produced has been fully characterized and is similar in many aspects to bacterially produced CNF, namely in terms of high aspect ratio, increased water retention, homogeneity, and purity of product. This process is also much faster than existing methods, with seaweed to CNF conversion time measured in hours rather than weeks, and it uses no harsh chemicals. Also, *Laminaria hyperborea* is higher in cellulose content than other *Laminaria* species and it is estimated that a sustainable harvest could potentially deliver up to 50,000 metric tons of cellulose per year for Scotland alone. Novel applications for this abundant source of CNF should be explored.

e: m.dorris@napier.ac.uk

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