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Renewable lignocellulosic biomass for the synthesis of cellulose derivatives

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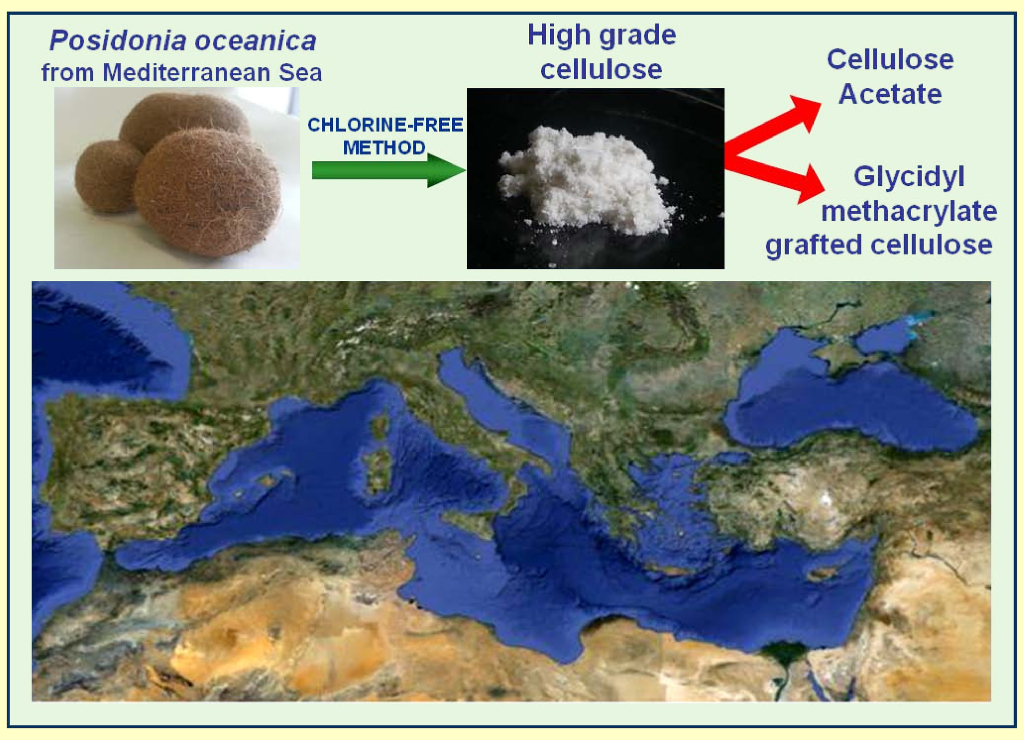
The valorisation of a marine biomass from P. oceanica and of short flax fibres, ears of corn and wheat-straw was achieved by recovering high-quality cellulose, which was transformed into a cellulose triacetate transparent film and into glycidyl methacrylate (GMA) -Cs materials. Cellulose was extracted using the two-step oxidative approach described in Scheme 1, that avoids the use of chlorinated substances, such as NaClO, in accordance with the recent green chemistry rules. GMA-Cs are strategic cellulose-based materials that we are developing as drug delivery devices and for more industrial, but not less sophisticated, applications, such as molecular wastewater filters.

Posidonia oceanica is a sea grass species that is typical of the Mediterranean basin. Its fibrous residues are ball-shaped dry materials, which are called egagropili and are found in large amounts along the Mediterranean coast.

The leading producers of flax fibre are France, Belgium and the Netherlands. Other significant producers are China, Belarus and the Russian Federation. The total area dedicated to flax cultivation for fibre is estimated at around 120 000 ha in Europe, and some 320 000 ha worldwide.

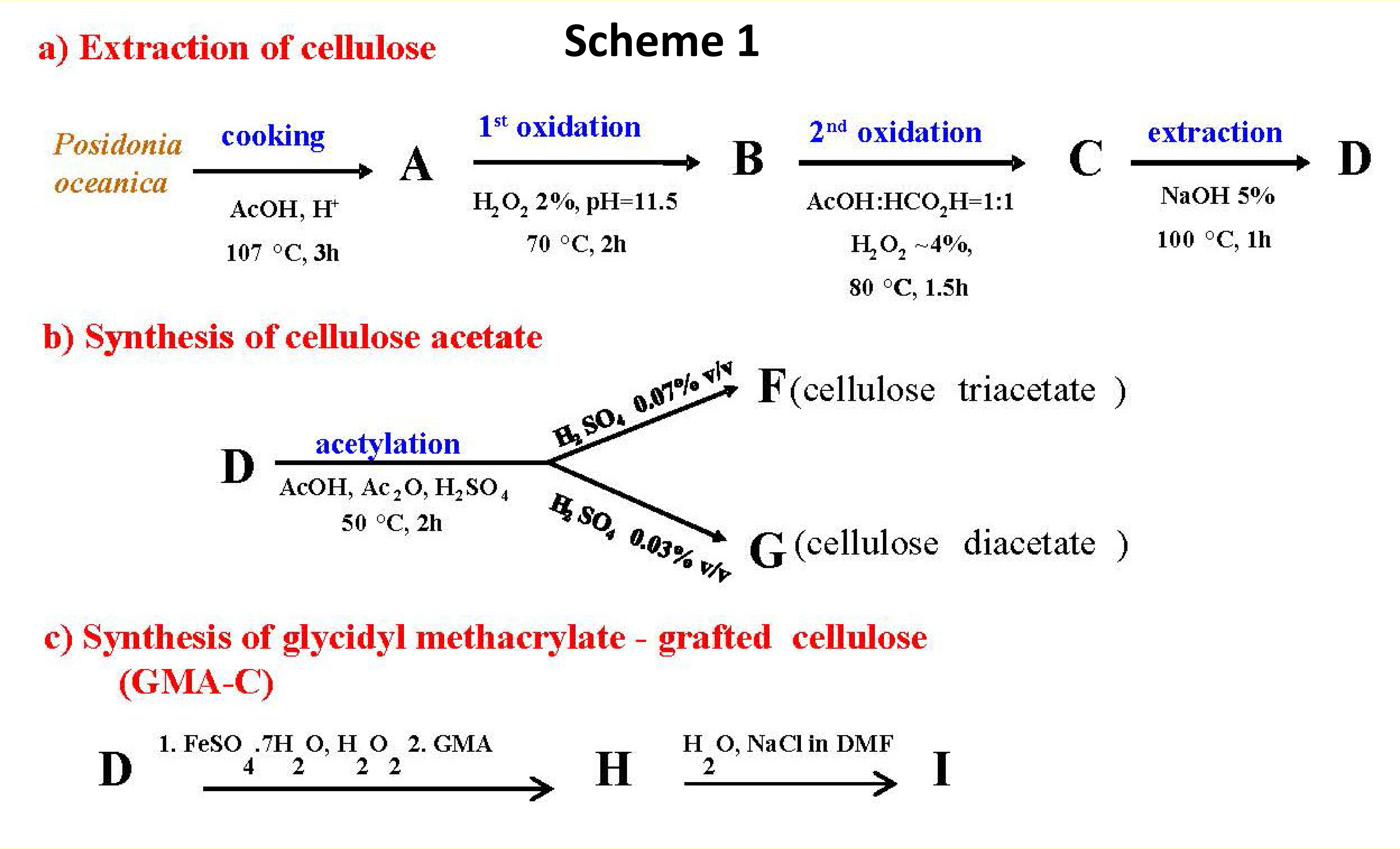


wheat-straw *ears of corn*

α cellulose *cell acetate film*

***Posidonia oceanica* as a renewable lignocellulosic biomass for the synthesis of cellulose acetate and glycidyl methacrylate grafted cellulose.** Materials (2013), 6, 2043. E. Vismara et al.

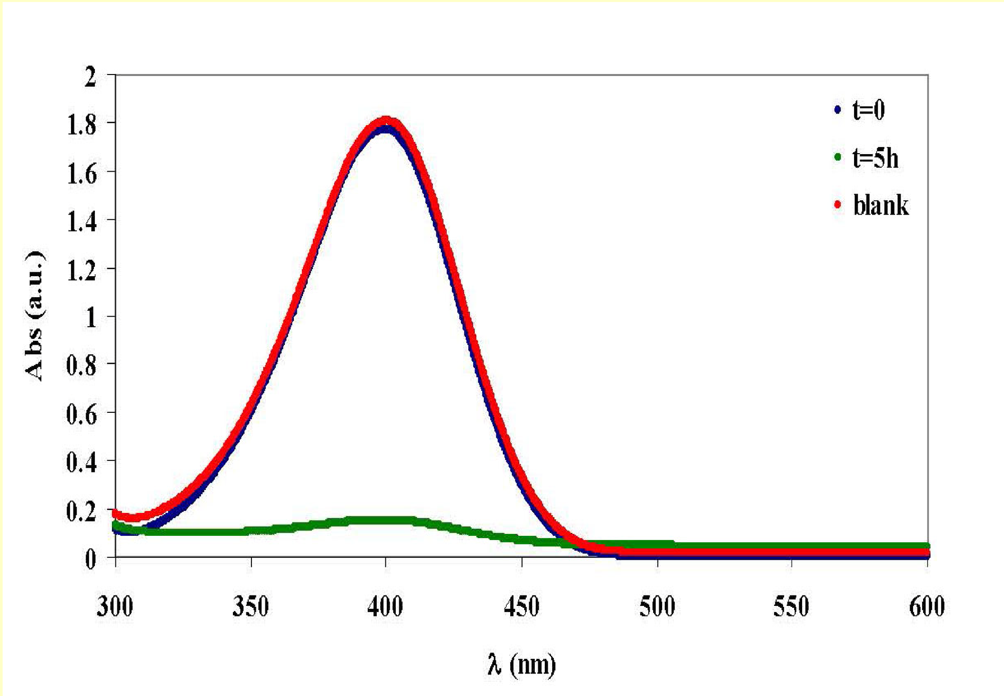
Alpha cellulose from industrial and agricultural renewable sources like short flax fibres, ears of corn and wheat-straw and its transformation into cellulose acetates. Journal of Mat. Chemistry (2009), 19, 8678 E. Vismara e al.



After hydrolysis of the glycidyl group to glycerol group, the modified GMA-C was able to remove p-nitrophenol from water with an efficiency of 92%.

α-cellulose and GMA-Cs from Posidonia waste can be considered as new materials of potential industrial and environmental interest.

Surface functionalization of cotton cellulose with glycidyl methacrylate and its application for the adsorption of aromatic pollutants from wastewaters. Journal of Hazardous Materials (2009), 170, 798. E. Vismara et al.



UV-Vis spectra of p-nitrophenol (PN) aqueous solutions. *Blue*: [PN]=1x10^{-4} M before the addition of cellulose. *Green*: 5 hours after the addition of modified cellulose I. *Red*: 5 hours after the addition of non-modified cellulose D.