

Smart nanomaterials with cellulosic matrix and magnetic properties

Pablo González Miguel

Susana Castelar Ariza, Gemma Ibarz Ric, Cristina Crespo Miñana

ITAINNOVA Instituto Tecnológico de Aragón,
María de Luna 7-8, 50018, Zaragoza, Spain

pablog@itainnova.es

Nanostructured cellulose availability is increasing in the global market. Several companies and research institutions are involved in the development and start-up of pilot to large scale production facilities, leading to an increase in a short-term production capacity [1]. Forecasts indicate that the largest consumption of this kind of materials will come from the paper, packaging and plastic industries, although the good value-for-money ratio indicates that other technical uses could be economically viable [2]. Magnetic materials are generally heavy, fragile and hard to processing, limiting their utilization in a wide range of potential applications. Smart papers are mainly composed by natural fibres that have been modified or enriched with additives, shifting the common use of paper towards new functionalities [3]. In this context, the development of smart materials based on nanostructured cellulose materials merges the excellent mechanical properties, and new "smart" properties, providing a significant added value to the product. By providing magnetic properties to paper-like produced sheets or films, a wide number of possible applications have been reported [4]. The main aim of this work is to obtain a nanocomposite preserving the inherent properties of the cellulose or nanostructured cellulose paper and increase the added value of the material with magnetic properties. From OCC pulp as raw material, we have explored two nanocomposite obtaining methods. Characterization of nanoparticles and fibres, physical, mechanical and new magnetic

properties of paper will be analyzed and discussed.

References

- [1] Miller, J., 2015 TAPPI International Conference on Nanotechnology for Renewable Materials (2015).
- [2] Shatkin, J. A., Wegner, T. H., Bilek, E. M., and Cowie, J., TAPPI J, 13 (2015), 9–16.
- [3] 3. Qiu, X. and Hu, S., Materials, 6 (2013), 738–781.
- [4] 4. Liu, S., Luo, X. and Zhou, J., Cellulose - Medical, Pharmaceutical and Electronic Applications, Chapter 6 (2013).

Figures

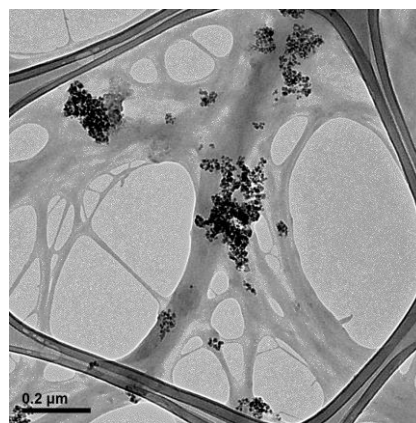


Figure 1: TEM image of magnetic nanoparticles attached to OCC nanofibrillated cellulose.

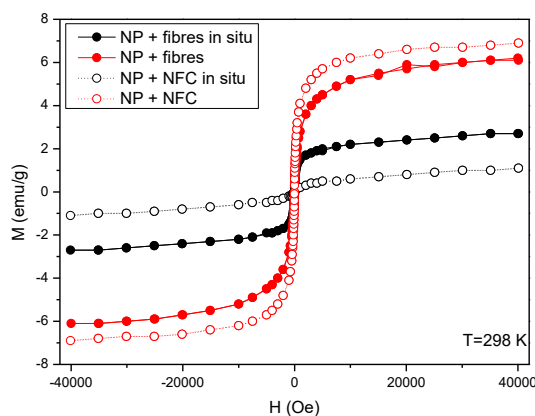


Figure 2: Isothermal magnetic behaviour of nanocomposites