Final publishable summary report

Executive summary

The aim of the GreeNanoFilms project is to **develop and apply ultra-high resolution nano-organized films by self-assembly of plant-based materials for next generation opto- and bio-electronics. (Figure 1)**

Carbohydrate biomass constitutes an abundant and renewable resource that is attracting growing interest as a biomaterial. Convincingly the use of different natural "elementary bricks", from oligosaccharides to fibers found in biomass, when mimicking self-assembly as Nature does, is a promising field towards innovative nanostructured biomaterials, leading to eco-friendly manufacturing processes of various devices. Indeed, the self-assembly at the nanoscale level of plant-based materials, via an elegant bottom-up approach, allows reaching very high-resolution patterning (sub-10nm) never attained to date by petroleum-based molecules, thus providing them with novel properties.

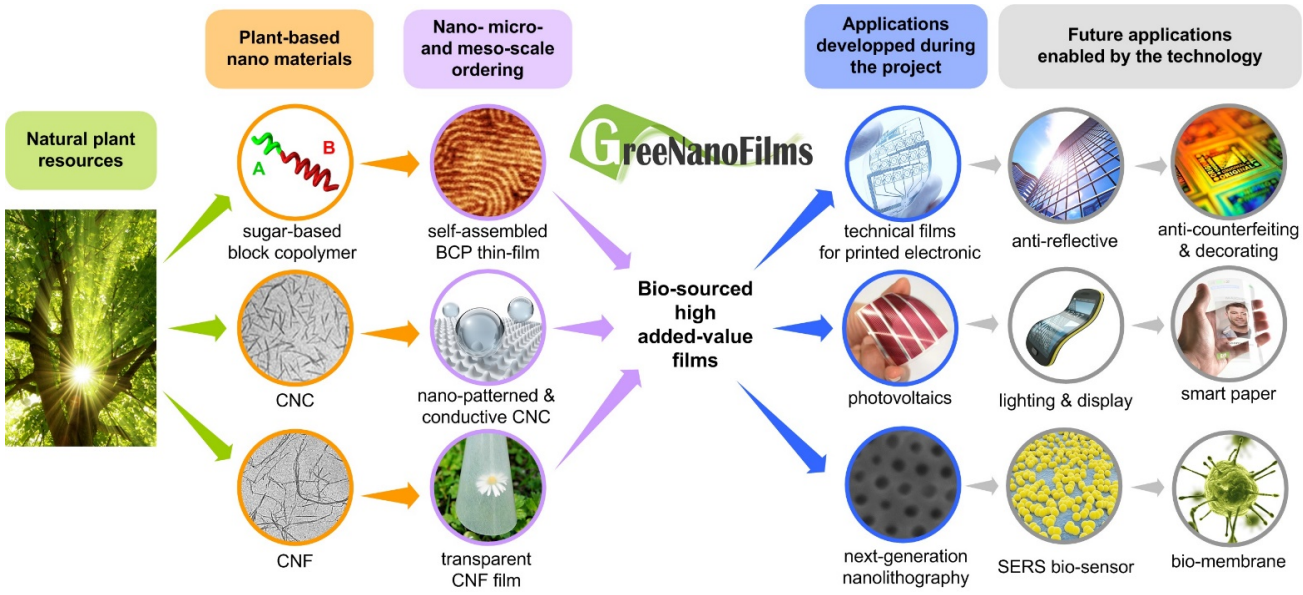

Figure 1: Innovation brought by GreeNanoFilms

Ten research and industry partners with different backgrounds, going from materials science and engineering, to chemistry, physics, electronics and micro/nano-technologies worked in a multidisciplinary approach and developed technical films to be used in various markets, from large volume sectors, such as :

- **(i)** high-added value transparent flexible substrate for printed electronic applications,
- **(ii)** thin films for high-efficiency organic photovoltaics,

to growing markets, such as :

- **(iii)** next generation nanolithography and
- **(iv)** high-sensitivity SERS biosensors.

GreeNanoFilms main impacts are the implementation of a new generation of ultra-nanostructured carbohydrate-materials that will play a prominent role in the achievement of the sustainability improvement of various opto- and bio-electronic sectors. A network of industrial end-user leaders is integrated in the project to facilitate the innovator-to-market perspective. The prospective environmental impacts and benefits of new green processes, eco-efficient nanomaterials and nanoproducts will be quantified with Life Cycle Assessment, risk assessment and validation of the industrial feasibility, including economic evaluation of the products. The results will be disseminated to the European smart paper, printed electronic, photovoltaic, display, security and health communities.

www.greenanofilms.eu