

## Green Amphiphilic Nanostructures from CNSL

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**Abstract :** In recent years, Cashew Nut Shell Liquid (CNSL) has received great attention from researchers because it is an abundant waste material from the agri-food industry that fits perfectly into the idea of reusing waste from renewable resources for the production of new functional materials. The different components of this waste showed a certain chemical versatility and, above all, various biological activities. Take advantage of their surface-active capacity in particular conditions, various amphiphilic nanostructures have been prepared through sustainable chemical processes using cardanol (CA) and anacardic acid (AA) as two main components of the CNSL. In-batch solvent-free method has been developed to obtain new versatile green nanovesicles capable of effectively incorporating and stabilizing both hydrophobic and hydrophilic bioactive molecules. Furthermore, these nanosystems have shown antioxidant and cytotoxic properties and, in vitro investigations, established that they efficiently taken-up some human cells. With the idea of meeting the principles of green chemistry, even more, some improvements of the synthetic procedure have been implemented in terms of milder temperature and pH conditions, producing one-component nanovesicles, in which the AA and CA-derivatives are the sole building block of the green nanosystems. Finally, a new experimental approach has been carried out by a microfluidic route, with the advantage to operate at continuous flows, with a reduced amount of reagents, waste, and at lower temperatures, ensuring the achievement of size-monodisperse amphiphilic nanostructures that do not need further purification steps.

**Keywords :** bioactive nanosystems, bio-based renewables, cashew oil, green nanoformulations

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