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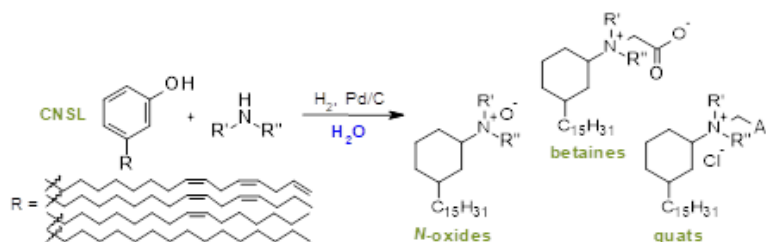
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Synthesis of new bio-based surfactants from cashew nutshell liquid in water

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Cashew nutshell liquid (CNSL) is an inedible waste product (1.000.000 t/a) in the cashew nut processing and is an excellent candidate for the synthesis of bio-based synthetically valuable compounds, as its production does not compete with the land use for food production. CNSL is a mixture of phenols bearing a 15-carbon side chain with different degrees of unsaturation. We have developed an eco-friendly and waste minimised concept for the synthesis of amine-based surfactants from CNSL. The key step of the procedure is a reductive amination of CNSL with molecular hydrogen in water as solvent, and palladium on charcoal as catalyst. The resulting cyclohexyl amines are successfully converted into N-oxide, betaine and quaternary ammonium tensides. Their surfactant properties (surface tension and critical micellar concentration) have been determined and resulted comparable with those of state-of-the-art commercial tensides, opening up a wealth of commercial applications. In the case of the particularly valuable N-oxide surfactant, a one pot synthesis with a remarkably low E-factor of 2 was realised in water as the sole solvent, with a hydrogen peroxide oxidation and purification by simple water extraction, thus avoiding the use of waste-intensive purification techniques. Overall, the process provides a new, eco-friendly procedure for the transformation of renewable waste products into industrially valuable compounds.



Biography

Valentina Bragoni has studied Chemistry at the University of Rome, Tor Vergata and started her PhD in July 2016 at the Ruhr Universität Bochum under Prof. Dr. Lukas J Gooßen.

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