Poster E9

Supercritical Fluids Mediated Processes for Materials Recycling

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Over the past few decades, supercritical fluids media have shown their versatility in materials science, *via* the development of greener, faster, cheaper and scalable processes through every steps of its life cycle. Indeed, such media can be used for the nucleation/growth of tailor-made materials (CeO_2, ZnO, etc...), their surface modification (CeO_2, ZnS, PbSe,...), their purification (cafein free coffee), and now their end of life (recycling). The SuperCritical Fluids team of ICMCB takes great interest in such applications focusing on the development of these supercritical fluids based technologies, with several national, European and international partners.

This oral communication proposes to expose recycling possibilities offered by supercritical fluids media (water, alcohols, carbon dioxide,...), studied and developed at the ICMCB-CNRS. In particular, results obtained with supercritical fluids for the recovery of carbon fibres from carbon fibre reinforced polymers (CFRPs) will be discussed [1]. This project was part of the research project RECCO (REcycling Carbon fibre Composites), involving the ICMCB-CNRS and national partners (INNOVEOX, Snecma, Astrium ST and Airbus). This project was proposed to develop a green and more efficient alternative to recycle CFRPs, following a European commission incentive to restrain landfill and incineration to dispose of these materials.

While chemical recycling of CFRPs shows good results, chemical processes may use solvents which can have negative effects on the environment and the human health, and thus balance positive effects of recycling. In order to reduce this impact, supercritical fluids have been used as a green reaction media for the solvolysis of CFRPs. Compared to pyrolysis, fluidized bed and low temperature processes, which are other studied approaches for CFRPs, solvolysis in near- or supercritical fluids is a great alternative to recover fibres as it provides a high retention of mechanical properties and fibre length and a high potential for material recovery from resin.

Reference

[1] MORIN, C., LOPPINET-SERANI, A., CANSELL, F., AYMONIER, C., J. Supercrit. Fluids, Vol. 66, **2012**, p.232