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G. Bernardes, Instituto de Medicina Molecular, Faculdade de Medicina, Universidade de Lisboa, Portugal.

Online Pre-conferences

- PCO1** *Technologies to upcycle plastic solid wastes into nanostructured carbon materials and their application in the removal of micropollutants.*
J. L. D. de Tuesta, Mountain Research Centre (CIMO), Polytechnic Institute of Bragança, Portugal.

Materials chemistry and applications

Technologies to upcycle plastic solid wastes into nanostructured carbon materials and their application in the removal of micropollutants

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The world's plastics production has been increasing stiffly over the years. Accounting only 2019, the global production of plastics reached nearly 370 million metric tonnes, with ca. 15.7% of those produced in Europe.¹ Recent projections point towards a cumulative generation of plastic solid wastes (PSWs) of over 25,000 million metric tonnes by 2050.² Among these, 36.4% are expected to be discarded in landfills or in the environment; a similar fraction (36.4%) should be incinerated, and only 27.2% will be recycled.² These forecasts point out that PSWs are mismanaged, mainly because current technologies are unable to promote proper reusing/recycling of these materials.³

Proper waste management falls within the scope of upstream responses. However, several difficulties have been hindering waste plastic recycling, such as the lack of economic attractiveness of the resulting products.⁴ Using waste plastics as feedstock for the production of added-value products and materials has been proposed as the boost needed to increase the attractiveness of plastics recycling. Among them are the preparation of carbon nanomaterials (CNs), such as carbon nanotubes or graphene, using PSWs as carbon precursors. This represents a new strategy for the valorisation of PSWs, consisting in the cracking of polymers that compose them and further synthesizing the CNs, using the resultant degradation gaseous products, by catalytic chemical vapour deposition (CCVD). However, most studies only report single pure polymers as model PSW to carry out a one-step process (pyrolysis and synthesis) without targeting applications of the resulting CNs.⁵⁻⁷ The properties of the CNs obtained from PSWs could be finely tuned for specific applications, as demonstrated in a previous work.⁸ These characteristics of the developed fine tuned CNs make them highly suitable for the removal of micropollutants, as will be shown in this talk.

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