



Transformation of Zn-ENMs during the anaerobic digestion

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Abstract

Engineering nanomaterials (ENMs) have been extensively used in particular consumer products which likely reach the natural system such as ecosystem during their use and disposal. Therefore, their impact has brought critical attention to be investigated. Understanding the risks, providing details and information about the particle's mechanisms and their state of art at the point of exposure to environmental species must be developed. In this work, the transformation and speciation of zinc oxide engineered nanomaterial (ZnO ENMs) had been investigated under environmental samples. ZnONPs were incubated in cell culture medium, green freshwater algae and spiked in an anaerobic digestion system. The dissolution and morphology of ZnONPs in OECD-MOPs medium were identified to show their behaviour during ageing and after spiking the ZnONPs to the algae. The same was applied to samples of the anaerobic digestion after sampling. Transmission electron microscopy (TEM) was used to show the morphology mostly by using STEM, and the speciation of ZnONPs was found by ray-absorption spectroscopy (Diamond light source, Oxfordshire UK). By applying the linear combination fitting for the resulted spectra, we found that the transformation of ZnONPs has partially sulfided to be ZnS and for ZnSNPs has a minor species of Zn₃(PO₂)₄ with an absorbed Zn to Fe-oxyhydroxides also there is still some Zn under process of dissolution.

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