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Ozonization of fermented municipal biowaste to produce value added products

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Soluble biobased lignin-like polymeric substances (SBO) isolated from the alkaline hydrolysates of compost, digestate and municipal biowaste (www.biochemenergy.it) have been reported as a promising and competitive source of biopolymers and biobased chemical auxiliaries. They have been tested in several diverse processes, e. g. as emulsifiers and surfactants in detergents, textile dyeing baths, flocculants, auxiliaries for soil and water remediation, nanostructured materials for chemical and biochemical catalysis, biopolymers, soil fertilizers and plant biostimulants for agriculture. These results offer the perspective to convert a municipal biowaste treatment plant into a biorefinery, integrating biochemical and chemical technology to produce biomethane and valued added bio-based chemicals.

To upgrade processes, properties and uses for the above SBO, a low temperature oxidation through ozonisation has been developed.

The anaerobic digestate and compost of a municipal biowaste treatment plant have been hydrolysed to yield biopolymers. These products are a mix of molecules, most of which have molecular weight ranging from 100 to over 750 kDa. They are multipurpose products for use in the chemical industry by virtue of their molecular weight and surfactant properties. Ozonization of the biopolymers changes significantly the molecular weight distribution and properties of the pristine biopolymers, yielding a product with improved surfactant properties and a higher ratio of small molecules. They are new products with no commercial counterparts, while the small molecules are the biobased counterpart of commercial chemicals obtained from fossil sources.

These results prospect the development of a biobased chemical industry built on the integration of biochemical and chemical technologies to convert municipal biowaste to value added products.