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TORNADO-NEW ROUTES OF SAFE AND SUSTAINABLE BY DESIGN WATER AND OIL REPELLENT BIOBASED COATINGS

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Abstract
TORNADO project aims to contribute to the transition to a safe circular economy by influencing how products should be designed, produced, used or treated at their end-of-life. New organic and hybrid free-toxic coatings with water and oil repellence following Safe and Sustainable by Design (SSbD) criteria will be developed. The novel proposed coatings will be PFAS free. TORNADO idea is to research and develop 1) Two new type of functionalized acrylated biomonomers with PDMS and POSS by two different chemical routes (acrylation and direct acrylation). 2) To synthesized and formulate 2 new biobased coatings based on the functionalized biomonomers by two technologies, waterborne organic and hybrid coatings and hybrid sol-gel coatings. Biomonomers and coatings will be scale up in an industrial environment. Coatings will be applied by different industrial processes depending on the industrial field. The two coatings will be validated in industrially relevant environments to obtain a performance at least identical to PFAS coatings in terms of water and oil repellence and tested according to the main textile, packaging and kitchenware specifications and requirements (waterproofness, oxygen barrier and durability, respectively). The improvement in environmental performance and circularity of the new coatings will be assessed through environmental Life Cycle Assessment, Life Cycle Cost, and social Life Cycle Analysis (LCA/LCC/s-LCA) of the proposed new coatings compared to traditionally used hazardous coatings. Computational tools will be developed for efficient interfacing with publicly accessible and accepted QSAR-models to facilitate ease-of-use in-silico prediction of required physiochemical properties, toxicological end-points and degradation.

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Biography
PhD degree in Chemical Sciences (University of Siena). Since 2017 he is working in Next Technology Tecnotessile as member of the chemical and technological research unit to support companies for competitiveness improvement. Experiences in funded projects in H2020, Horizon Europe and CBE JU programmes related to sustainable textile and circular economy approaches. He has the expertise for environmental evaluation of industrial value chains.