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Innovative approaches in monitoring and removal of contaminants of emerging concern from water

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Due to the numerous chemicals in daily use, there are many compounds that reach the environment unintentionally and/or uncontrolled, which presence is not subjected to regular monitoring or control measures. Hence, there are many different classes of these so-called compounds of emerging concern (CECs) such as pharmaceutically active compounds, personal care products, polar pesticides, poly- and perfluoroalkyl substances, microplastics, industrial chemicals, etc. Some evidence has shown that "cocktail" of CECs in the environment may adversely affect human health and ecosystems, although many of them are generally present in traces (e.g., from ng/L to μg/L in water samples). Among them, there are many persistent and mobile substances, passing natural and artificial barriers (e.g., riverbanks, filtration in water treatment plants) and accumulating for a long period in the environment. If the degradation occurs, the formed products are also regarded as CECs, additionally affecting the chemical safety of the environment. Having different physical and chemical properties, the simultaneous selective and sensitive detection of CECs is an important analytical challenge.

The intention of this presentation is to give an overview of the work conducted so far on the CECs monitoring in water resources from Western Balkan countries, and to discuss selected new analytical approaches and technologies for removal of CECs in water. These are the main research topics within the Horizon Europe project TwiNSol-CECs (101059867), important for harmonizing the relevant research efforts across the region and beyond as an important link in transition foreseen by European Green Deal towards zero pollution, toxic-free environment.

Keywords: CECs, analysis, screening, UHPLC-MS, membrane processes, biosorbents