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**VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI**

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z naslovom:

**Treatment of Cyanotoxins and
Contaminants of Emerging Concern in
Water Using Advanced Oxidation
Processes**

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Vljudno vabljeni!

Abstract:

Advanced Oxidation Processes (AOPs) are gaining popularity for the removal of contaminants of emerging concern, especially for applications in the purification of drinking water, treatment of wastewater effluent (i.e., for discharge or reuse applications), decontamination of industrial effluents, and remediation of groundwater. Homogeneous and heterogeneous AOPs are currently intensively explored, modified, and optimized for applications as stand-alone technologies or integrated with other processes in the overall treatment train. Several new AOPs demonstrating promising results have been developed in recent years. While most of these technologies are based on hydroxyl radical as oxidizing species, some AOPs involve other radical species such as sulfate radical and superoxide anion radical, which are also more selective. While less efficient for destruction of organic contaminants, superoxide anion radical can play a significant role in water disinfection by solar light. Recent interest has also spurred in reductive pathways of AOPs for application in reduction of metals, nitrate, bromate and other species of importance in water quality. More recent studies have also delved into mechanistic insights of AOPs, including identification of reaction intermediates, unveiling reaction pathways, determination of treated solution toxicity, and the role of water quality on the reaction mechanisms and reaction kinetics. Recent progress in nanotechnology also propelled new advances in the field of heterogeneous AOPs. The use of solar light by some of these processes (i.e., solar photocatalysis, solar photoelectrocatalysis, solar disinfection) has expanded potential application in parts of the world that have plenty of sunlight but also have critical needs in water quality and energy generation. In this presentation, Professor Dionysiou will overview mechanistic transformation pathways of treatment of cyanotoxins and other contaminants of emerging concern in water using AOPs. Emphasis will be given on UV and Solar-based Advanced Oxidation Processes such as TiO₂-based photocatalysis (UV and visible) (i.e., a heterogeneous AOP) and UV/H₂O₂ process (i.e., a homogeneous AOP). Details will be presented on the degradation of cyanotoxins and other selected contaminants. Most emphasis will be placed on the oxidative pathways for the degradation of microcystin-LR and cylindrospermopsin. Transformation kinetic rates and reaction intermediates formed by OH radical attack and other reactive oxygen species on specific sites of the target contaminants will be presented and the detailed reaction pathways will be discussed. Discussion will also be provided when oxidation takes place by other radicals such as sulfate radicals and superoxide anion radicals under certain modifications of the processes described above. The role of water quality parameters such as natural organic matter, alkalinity and pH will be discussed, considering also the chemistry of the target contaminants and, in the case of heterogeneous AOPs, the role of the catalyst nano-interface.