

Mesoporous silica supported photocatalysts in water pollution remediation

Nataša Novak Tušar, Andraž Šuligoj, Ksenija Maver, Nimisha Kuruvangattu Puthenveetil, Urška Lavrenčič Štangar, Albin Pintar

National Institute of chemistry, Hajdrihova 19, Ljubljana Slovenia

University of Ljubljana, Faculty of Chemistry and Chemical Technology, Večna pot 113, Ljubljana, Slovenia

University of Nova Gorica, Graduate School, Vipavska 13, Nova Gorica, Slovenia

natasa.novak.tusar@ki.si

Abstract

Pollution of water bodies by organic pollutants, so-called contaminants of emerging concern (CECs), has become an important issue. Among treatment methods, advanced oxidation processes (AOPs) are notable for generating reactive oxygen species that degrade pollutants into harmless byproducts. [1] Fenton AOP as homogeneous catalytic process is the most industrial applicable AOP. It uses iron salts as catalysts and hydrogen peroxide as an oxidising agent. However, it has drawbacks like acidic pH requirements, iron sludge production, and excess iron ions. To address this, Fenton-like AOP reactions as heterogeneous catalytic process at neutral pH are explored. [1,2] In this lecture, we will show that porous silica with interparticle mesoporosity exhibits optimal properties for functionalization with multi-component transition metals (Cu, Mn, Fe). The material exhibits photocatalytic properties and enables advanced photo-Fenton AOP under visible light and neutral pH, offering a sustainable strategy for CEC removal from water using sunlight.

References

- [1] Vasile I Parvulescu, Florence Epron, Hermenegildo Garcia, Pascal Granger, Chem. Rev. 122, 3 (2022) 2981–3121.
- [2] Andraž Šuligoj, Ivalina Trendafilova, Ksenija Maver, Albin Pintar, Alenka Ristić, Goran Dražić, Wael H.M. Abdelraheem, Zvonko Jagličič, Iztok Arčon, Nataša Zabukovec Logar, Dionysios D. Dionysiou, Nataša Novak Tušar, Journal of Environmental Chemical Engineering, 11 (2023) 110369.

Figures

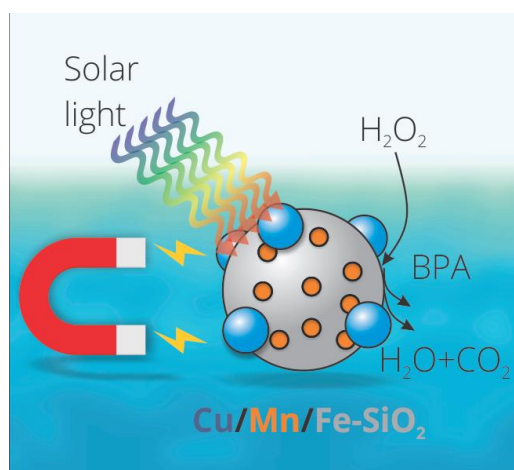


Figure 1: Multicomponent Cu-Mn-Fe silica supported catalysts to stimulate photo-Fenton-like water treatment under sunlight.