Lunedì 9 giugno ore 11
Aula D, Dipartimento di Scienze Chimiche

Seminario

Materials-by-design for water remediation: Successes and Falls

Prof. Isabella Concina
Department of Engineering Sciences and Mathematics,
Luleå University of Technology, Sweden

email: isabella.concina@ltu.se

Clean water demand and shortage are foretold to increase in the near future, due to increasing industrialization, population growth and the short-medium term draughts we are facing all around the world since lately. According to the estimation of the World Wide Fund for Nature, by 2025 two third of the world population will suffer from clean water shortage and the ecosystems will be as well heavily affected, due to increasing pollution of the fresh water resources of the planet. Among the water contaminants, dyes and phenolic compounds are enlisted by the European Union as pollutants of priority concern, together with the residuals of antibiotics, which have caused the insurgence of antimicrobial resistance, recognized as a priority for global public health. The capability of cleaning waters has then become even more urgent than it used to be.
In this frame, the scientific community of materials scientists is engaged in a huge effort to design efficient, durable, robust and easy-to-recover adsorbents and photocatalysts, as testified by the impressive number of papers (almost 95 000 according to the Web of Science, June 2023) appeared in the last decade.
This lecture will present and critically discuss some paradigmatic cases of nano- and micro-composites based on semiconductors (such as ZnO, BiOI, Prussian blue analogues, g-C_3N_4) specifically engineered to adsorb and/or degrade dyes, phenolic compounds and pharmaceutical residuals. Emphasis will be put on the factors currently limiting our success in water remediation:
→ The set up of standard and reproducible experiments;
→ The unambiguous analysis of correlations between materials properties (structure and texture, light-matter interaction, chemical composition) and their performance as adsorbents and catalysts;
→ The underrating of the adsorption step;
→The understanding of reaction kinetics and mechanisms, which is key to the design of more efficient materials.

Prof.ssa Silvia Gross
Dott.ssa Marta Maria Natile
Dipartimento di Scienze Chimiche

Il Direttore del Dipartimento
Prof. Stefano Mammi