

PhD Candidate Profile

Name:

Mister Adeel

Research Group (if relevant):

Water Science and Technology (WaSTe)

Research Centre (if relevant):

Environmental Sanitary Engineering Laboratory (SEED)

Department/School(s) (if relevant):

Civil Engineering

College:

University of Salerno

Supervisor(s):

Luigi Rizzo

Funding body:

Programma Operativo Nazionale (PON)

Area (field) of study:

Wastewater Treatment

Thesis Title:

Sustainable advanced oxidation based solution for tertiary treatment of urban wastewater

Abstract:

The recent approval of the first European regulation on wastewater reuse (2020/741), and its forthcoming application (26/06/2023), is a challenge for the managers of urban wastewater treatment plants. As a matter of fact, the minimum requirements for reuse, in particular with regard to the inactivation of pathogens and possibly also to the removal of the so-called contaminants of emerging concern (CECs), are difficult to achieve with conventional tertiary processes (eg. sand filtration and chemical disinfection or with UV radiation.). In this scenario, the need to develop more effective and sustainable processes compared to the state of the art is evident.

Advanced oxidation processes (AOP) are an interesting alternative as they can allow the simultaneous removal of pathogens and CECs and, the photo-activated ones, can be implemented with solar radiation instead of artificial one. Among the solar driven AOPs, photo-Fenton is certainly one of the most effective, but the optimal operating conditions (acidic pH), together with the lack of legislation that set more restrictive conditions on the quality of the effluent, have held back its application at full scale.



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The research activity will focus on the study of sustainable solutions for the tertiary treatment of urban wastewater to be reused, which can use solar radiation instead of artificial radiation and/or green reagents, as in the case of the solar photo-Fenton process with the use of biodegradable chelating agents, to operate the process at neutral pH. This solution will be compared with the conventional ones and with other photo activated AOPs, in order to identify the most appropriate and sustainable green process, also through tools such as Life Cycle Assessment.

Collaborations:

- Plataforma Solar de Almeria (Spain)
- Biotec, Italy

Publications:

1. **Mister Adeel**, Yubo Xu, Long-Fei Ren, Jiahui Shao, Yiliang He, Improvement of phenol separation and biodegradation from saline wastewater in extractive membrane bioreactor (EMBR), *Bioresource Technology Reports*, 17 (2022), 100897.
2. **Mister Adeel**, Long-Fei Ren, Jun Li, Jiahui Shao, Ahmed Jawad, Chen Su, Yumei Wang, Li Guo, Yiliang He, Improved/enhanced Mechanical strength of PDMS/PMMA composite nanofiber membrane using MWCNTs and its application in phenol separation and salt rejection, *Journal of Applied Polymer Science*, 136 (2019), 47123-47131.
3. Long-Fei Ren, **Mister Adeel**, Jun Li, Cong Xu, Zheng Xu, Xiaofan Zhang, Jiahui Shao, Yiliang He, Phenol separation from phenol-laden saline wastewater by membrane aromatic recovery system-like membrane contactor using superhydrophobic/organophilic electrospun PDMS/PMMA membrane, *Water Research*, 135 (2018), 31-43.
4. Jun Li, Long-Fei Ren, Jiahui Shao, **Mister Adeel**, Yonghui Tu, Zhongbao Ma, Yiliang He, Effect of ionic liquid on the structure and desalination performance of PVDF-PTFE electrospun membrane, *Journal of Applied Polymer Science*, 137 (2020), 48467.
5. Jawad Ahmed, Sidra Mushtaq, **Mister Adeel**, Fabrication of ethylene-vinyl acetate copolymer/polyamide/modified sepiolite composite with improved physical properties via e-beam irradiation, *Radiation Physics and Chemistry*, 189 (2021), 109779.

Presentations:

N/A