

## PhD Candidate Profile

**Name:**

Eva Domingues

**Research Group (if relevant):**

N/A

**Research Centre (if relevant):**

CIEPQPF - Chemical Process Engineering and Forest Products Research Centre

**Department/School(s) (if relevant):**

Department of Chemical Engineering

**College:**

University of Coimbra, Portugal

**Supervisor(s):**

Dr. Rui C. Martins

**Funding body:**

FCT: Foundation for Science and Technology, PT

**Area (field) of study:**

Wastewater treatment by advanced oxidation processes

**Thesis Title:**

Sludge free-Fenton integrated methodology for olive mill wastewater treatment.

**Abstract:**

Agro-industries are an important part of European industrial tissue; particularly in Mediterranean countries. These industries produce large amounts of liquid effluents with a strong organic charge. These wastewaters encompass biorefractory and toxic substances. On the other hand, their composition and flow change during the year. These features make impossible the efficient application of the traditional biological treatment systems. Moreover, the environment and sustainability awareness is leading to an even more strict legislation regarding waste management. Therefore, seeking for suitable alternatives is a current affair.

Fenton's process is an interesting treatment alternative. However, iron sludge production constitutes an important drawback that must be overcome. This project aims to reach a sludge free Fenton's process by following two alternative pathways: the application of heterogeneous Fenton's process using iron rich wastes as solid catalysts and integrating homogeneous Fenton's process with ion-exchange to remove iron from solution and reuse it in further oxidation cycles.

**Collaborations:**

N/A

### Publications:

Domingues, E., Silva, M., Vaz, T., Gomes, J., Martins, R.C. (2022) Sulfate radical based advanced oxidation processes for agro-industrial effluents treatment: A comparative review with Fenton's peroxidation. *Sci. Total Environ.* 832: 155029.

Vaz, T., Domingues, E., Gomes, J., Martins, R.C. (2022) Evaluation of the Activation Procedure on Oxone Efficiency for Synthetic Olive Mill Wastewater Treatment. *Catalysts.* 12(3):291.

Domingues, E., Fernandes, E., Vaz, T., Gomes, J., Castro-Silva, S., Martins, R.C., Quinta-Ferreira, R., Ferreira, L.M. (2022) Ion Exchange to Capture Iron after Real Effluent Treatment by Fenton's Process. *Water.* 14(5):706.

Domingues, E., Silva, M., Vaz, T., Gomes, J., Martins, R.C. (2021) Persulfate Process Activated by Homogeneous and Heterogeneous Catalysts for Synthetic Olive Mill Wastewater Treatment. *Water.* 13(21):3010.

Gomes, J., Jesus, F.T., Domingues, E., Gonçalves, F.J.M., Pereira, J.L., Martins, R.C. (2021) Photocatalytic oxidation of pharmaceutical contaminants of emerging concern using sunlight and visible radiation: Mechanism and ecotoxicological evaluation. *J. Water Process Eng.* 43(5):102204.

Gomes, J., Domingues, E., Fernandes, E., Castro, L., Martins, R.C., Quinta-Ferreira, R. (2021) Coagulation and biofiltration by *Corbicula fluminea* for COD and toxicity reduction of swine wastewater. *J. Water Process Eng.* 42:102145.

Domingues, E., Fernandes, E., Gomes, J., Martins, R.C. (2021) Advanced Oxidation Processes perspective regarding swine wastewater treatment. *Sci. Total Environ.* 776(3):145958.

Domingues, E., Fernandes, E., Gomes, J., Castro-Silva, S., Martins, R.C. (2021) Olive oil extraction industry wastewater treatment by coagulation and Fenton's process. *J. Water Process Eng.* 39:101818.

Domingues, E., Fernandes, E., Gomes, J., Martins, R.C. (2021) Swine wastewater treatment by Fenton's process and integrated methodologies involving coagulation and biofiltration. *J. Clean. Prod.* 293(3):126105.

Domingues, E., Rodrigues, F., Gomes, J., Quina, M.J., Castro-Silva, S., Martins, R.C. (2020) Screening of low-cost materials as heterogeneous catalysts for olive mill wastewater Fenton's peroxidation. *Energy Reports.* 6:161-167.

Gomes, J., Domingues, E., Gmurek, M., Quinta-Ferreira, R., Martins, R.C. (2019) Advanced oxidation processes for recalcitrant compounds removal comparison with biofiltration by *Corbicula fluminea*. *Energy Reports.* 6.

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Domingues, E., Gomes, J., Assunção, N., Gmurek, M., Quina, M.J., Quinta-Ferreira, R., Martins, R.C. (2019) Iron-based catalysts under solar and visible radiation for contaminants of emerging concern removal. *Energy Reports*. 6.

Domingues, E., Assunção, N., Gomes, J., Lopes, D.V., Frade, J.R., Quina, M.J., Quinta-Ferreira, R., Martins, R.C. (2019) Catalytic Efficiency of Red Mud for the Degradation of Olive Mill Wastewater through Heterogeneous Fenton's Process. *Water* 11(6):1183.

Gomes, J., Lincho, J., Domingues, E., Gmurek, M., Mazierski, P., Zaleska-Medynska, A., Klimczuk, T., Quinta-Ferreira, R., Martins, R.C. (2019) TiO<sub>2</sub> nanotube arrays-based reactor for photocatalytic oxidation of parabens mixtures in ultrapure water: Effects of photocatalyst properties, operational parameters and light source. *Sci. Total Environ*. 689.

Martins, R.C., Domingues, E., Bosio, M., Quina, M.J., Gmurek, M., Quinta-Ferreira, R., Gomes, J. (2019) Effect of Different Radiation Sources and Noble Metal Doped onto TiO<sub>2</sub> for Contaminants of Emerging Concern Removal. *Water*. 11(5):894.

Gomes, J., Lincho, J., Domingues, E., Quinta-Ferreira, R., Martins, R.C. (2019) N-TiO<sub>2</sub> Photocatalysts: A Review of Their Characteristics and Capacity for Emerging Contaminants Removal. *Water*. 11(2):373.

Domingues, E., Gomes, J., Quina, M.J., Quinta-Ferreira, R., Martins, R.C. (2018) Detoxification of Olive Mill Wastewaters by Fenton's Process. *Catalysts*. 8(12):662.

Loureiro, P., Domingues, E., Evtuguin, D.V., Carvalho, M.G. (2010) ECF bleaching with a final hydrogen peroxide stage: Impact of the chemical composition of Eucalyptus globulus kraft pulps. *Bioresources*. 5(4):2567-2580.

### Presentations:

13<sup>th</sup> International Chemical and Biological Engineering Conference (CHEMPOR 2018). Aveiro, Portugal, 2-4 October 2018. *"Sludge free solar photo-Fenton combined with biofiltration for the degradation of phenolic compounds from olive mill wastewaters"*.

6<sup>th</sup> International Conference on Energy and Environment Research (ICEER 2019). Aveiro, Portugal, 22-25 July 2019. *"Screening of low-cost materials as heterogeneous catalysts for olive mill wastewater Fenton's peroxidation"*.

12<sup>th</sup> European Congress of Chemical Engineering (ECCE12). Florence, Italy, 15-19 September 2019. *"Iron-based catalysts under solar and visible radiation for contaminants of emerging concern removal"*.

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24<sup>th</sup> IOA Congress and Exhibition. Nice, France, 20-25 October 2019. *“Solar photo-Fenton for olive mill wastewater treatment”*.

7th International Conference on Energy and Environment Research, ICEER 2020. Porto, Portugal, 14–17 September 2020. *“Heterogeneous solar photo-Fenton using red-mud as low-cost catalyst for olive mill wastewater treatment”*.

2<sup>nd</sup> International Conference on “Chemical Engineering and Catalysis, ICCEC-2021,”. Miami, USA, November 16-17 2021. *“Oil Extraction Industry Wastewater Treatment by Coagulation and Fenton’s Process”*