

Martedì **19 novembre 2019** alle ore **15:30** presso l'aula I

il **Dr. Cédric Tard**

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terrà il seminario dal titolo:

## **Proton-Coupled Electron Transfer: Mechanistic Studies and Water Electrolysis**

*La presenza della S. V. sarà molto gradita*

### **Abstract**

Electrochemical water splitting is one of the clean technologies for the production on a large scale of highly pure dihydrogen H<sub>2</sub>, a potential major energy vector for the near future. Benchmarking protocols for evaluating the electrocatalytic water splitting have been proposed over the years in order to rationalize the assessment of the activity and stability of heterogeneous hydrogen and oxygen evolution reaction (HER and OER) electrocatalysts. Nevertheless it is still difficult to have access to reliable electrochemical measurements to get a direct insight into the mechanism for the HER and OER due to the complexity of these multiple electron/proton transfer reactions. In-depth cyclic voltammetry (CV) analysis has been shown to be a very powerful tool to address intricate reaction mechanisms involving proton-coupled electron transfer (PCET) reactions.<sup>[1]</sup> We demonstrated that we could use this analytical technique to study intramolecular PCET reactions,<sup>[2]</sup> molecular bond breaking coupled with PCET reactions,<sup>[3]</sup> molecular catalytic reactions coupled with PCET,<sup>[4]</sup> and recently heterogeneous electrocatalyst mechanisms involving PCET.<sup>[5]</sup> Those fundamental reactions are illustrated with theoretical analysis and experimental examples.<sup>[6]</sup>

[1] Costentin, C.; Robert, M.; Savéant, J.-M.; Tard, C. *Acc. Chem. Res.* **2014**, *47* (1), 271.

[2] Costentin, C.; Robert, M.; Savéant, J.-M.; Tard, C. *Angew. Chem. Int. Ed.* **2010**, *49* (22), 3803.

[3] Savéant, J.-M.; Tard, C. *J. Am. Chem. Soc.* **2014**, *136* (25), 8907.

[4] Costentin, C.; Savéant, J.-M.; Tard, C. *ACS Energy Letters* **2018**, *3* (3), 695.

[5] Costentin, C.; Di Giovanni, C.; Giraud, M.; Savéant, J.-M.; Tard, C. *Nat. Mat.* **2017**, *16* (10), 1016.

[6] Faustini, M.; Giraud, M.; Jones, D.; Rozière, J.; Dupont, M.; Porter, T. R.; Nowak, S.; Bahri, M.; Ersen, O.; Sanchez, C.; Boissière, C.; Tard, C.; Peron, J. *Adv. Energy Mater.* **2019**, *9*, 1802136.

Flavio Maran

**Il Direttore del Dipartimento**  
Michele Maggini