TOR VERGATA
UNIVERSITÀ DEGLI STUDI DI ROMA

Dipartimento di Scienze e Tecnologie Chimiche

AVVISO DI SEMINARIO

Giovedì 21 Novembre alle ore 15:30

in **Aula Gismondi**

il Prof. Cédric Tard

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Terrà un seminario dal titolo:

"Proton-Coupled Electron Transfer: Mechanistic Studies and Water Electrolysis"

Proponente: Prof. Gaio Paradossi

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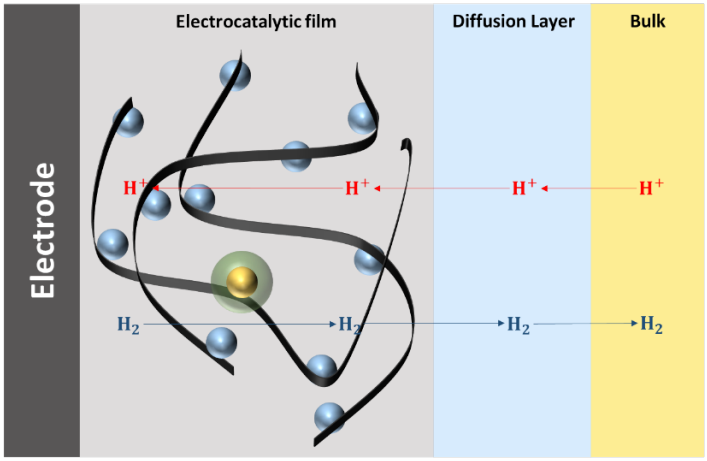
Abstract

Electrochemical water splitting is one of the clean technologies for the production on a large scale of highly pure dihydrogen H_2, 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.[1] We demonstrated that we could use this analytical technique to study intramolecular PCET reactions,[2] molecular bond breaking coupled with PCET reactions,[3] molecular catalytic reactions coupled with PCET,[4] and recently heterogeneous electrocatalyst mechanisms involving PCET.[5] Those fundamental reactions are illustrated with theoretical analysis and experimental examples.[6]



Biographie

Cédric Tard received his PhD from the John Innes Center (University of East Anglia, Norwich, U.K.) under the supervision of Prof. Chris Pickett in 2005. After two years as a post-doctoral fellow at the Laboratoire de Physique de la Matière Condensée (Ecole Polytechnique, Palaiseau) in the group of Prof. Jean-Pierre Boilot, he joined the Laboratoire d'Electrochimie Moléculaire (Université Paris Diderot) in the group of Prof. Jean-Michel Savéant as CNRS researcher. He has been appointed Professeur Chargé de Cours at the Ecole Polytechnique in 2016 and joined the Laboratoire de Chimie Moléculaire (Ecole Polytechnique, IP Paris) in January 2017.

[1] a) Bonin, J.; Costentin, C.; Robert, M.; Savéant, J.-M.; Tard, C. *Acc. Chem. Res.* **2012,** *45* (3), 372; b) 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] a) Costentin, C.; Hajj, V.; Robert, M.; Savéant, J.-M.; Tard, C. *Proc. Natl. Acad. Sci. U. S. A.* **2011,** *108* (21), 8559; b) Savéant, J.-M.; Tard, C. *J. Am. Chem. Soc.* **2014,** *136* (25), 8907.

[4] a) Savéant, J.-M.; Tard, C. *J. Am. Chem. Soc.* **2016,** *138* (3), 1017; b) 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.