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CHEMELECTROCHEM
Cover Profile

Dipole Moment Effect on the Electrochemical Desorption of Self-Assembled Monolayers of 3_{10}-Helicogenic Peptides on Gold


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The front cover artwork is provided by Pierangelo Gobbo and Flavio Maran, University of Padova (Italy). The image highlights how the orientation of the dipole moment associated with helical peptides affects the electrodesorption potential of the corresponding self-assembled monolayers. Read the full text of the Article at 10.1002/celc.201600573.

What topics are you working on at the moment?

The Molecular Electrochemistry and Nanosystems Group at the University of Padova focuses on molecular electrochemistry, organic and bio-electrochemistry, electron transfer, monolayer-protected clusters, redox catalysis, and biosensors.

What prompted you to investigate this topic?

The peptides of α-aminoisobutyric acid (Aib) form 3_{10}-helices, even when short, which makes them display a strong oriented dipole moment. Length and dipole moment can be finely tuned by changing the number of residues. These features provide an excellent opportunity to study in detail the effect of oriented dipole moments on the electrodesorption of self-assembled monolayers (SAMs).

What is the most significant result of this study?

Combined spectroscopic and electrochemical investigation shows that thiolated Aib-peptides can be highly structured and organized when self-assembled onto gold surfaces. Cyclic voltammetry evidences that the electrodesorption potential is significantly affected by both peptide length and orientation, in a way consistent with a strong effect exerted by the dipole moment of the peptide.

What future opportunities do you see?

When chemisorbed on metal or semiconductor surfaces, SAMs may tune the work function of the underlying material: our results highlight that suitably chosen Aib-peptides could be employed to control this fundamental property, with important implications in applied fields. Tight packing in SAMs, formation of a strong H-bond network, and remarkable properties as electron-transfer mediators concur to indicate that Aib-peptides are particularly suitable to bridge molecular systems and electrode surfaces in electrochemical biosensors.

Acknowledgements

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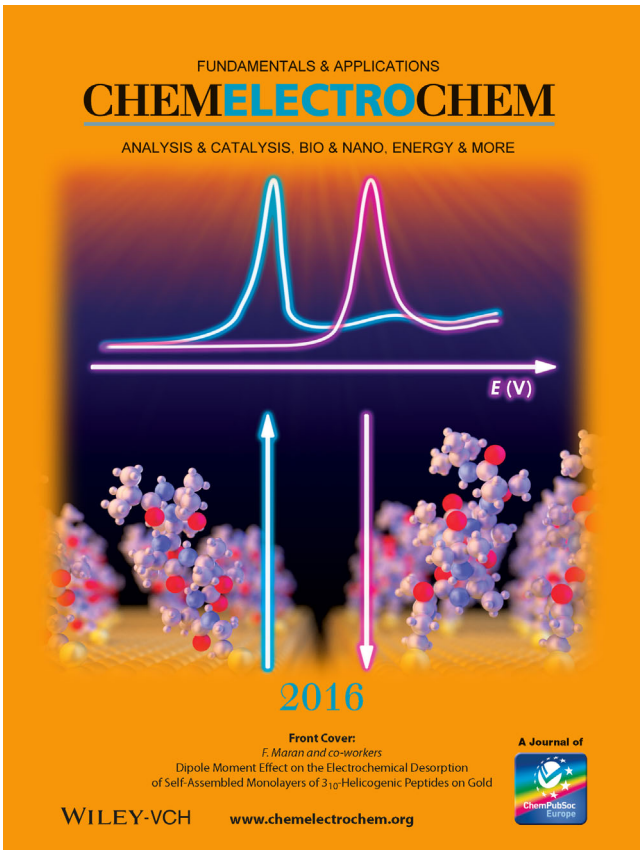

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COVER PROFILE

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"Reductive desorption of self-assembled monolayers of thiolated peptides of α-aminoisobutyric acid is significantly affected by both peptide length and orientation in a way that highlights the importance of the electric dipole moment along the main peptide axis…."
Find out more about the story behind the front cover research at 10.1002/celc.201600573.