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Short Abstracts of Interesting Recent Publications of Swiss Origin

When Dielectric Constants Deceive: Interrogating Solvation in Ionic Liquids with Cyclic Voltammetry

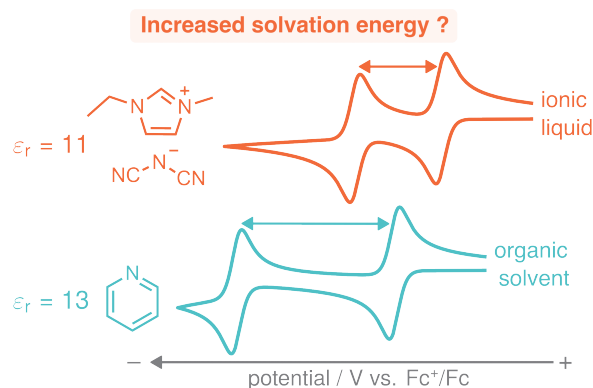
Johannes Wega*, Franck Guignard, and Eric Vauthey

J. Phys. Chem. B **2026**, <https://doi.org/10.1021/acs.jpbc.6c00284>
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Ionic liquids are increasingly explored as alternatives to conventional organic solvents in light-driven technologies based on photoinduced electron transfer. For the rational design of such systems, reliable estimates of electron-transfer driving forces are required. Based on the Born solvation model, the moderate dielectric constants of ionic liquids ($\epsilon_r \approx 8\text{--}15$) suggests solvation energies similar to those of medium-polarity solvents such as dichloromethane or pyridine. The Vauthey group tested this assumption by experimentally comparing solvation energies of three small organic solutes relevant to photochemistry in several imidazolium-based ionic liquids and conventional organic solvents. Solvation energies were inferred from relative shifts in half-wave reduction potentials measured by cyclic voltammetry. For the investigated solutes, the ionic liquids showed solvation energies comparable to those of highly polar solvents such as acetonitrile and dimethyl sulfoxide. While the conventional organic solvents follow the qualitative trend predicted by the Born equation, ionic liquids show significant deviations, providing substantially larger solvation energies than solvents with similar dielectric constants. This behaviour is attributed to the intrinsically high ionic strength of ionic liquids, which enhances electrostatic screening and thus increases electron-transfer driving forces.

Authors' comments:

“We are happy to finally understand why ionic liquids behave like highly polar solvents in photoinduced electron transfer and to provide a theoretical framework for salt effects in these reactions.”



Electronic Coupling of Molecular Complexes to Au Electrodes Mediated *via* Host–Guest Interactions

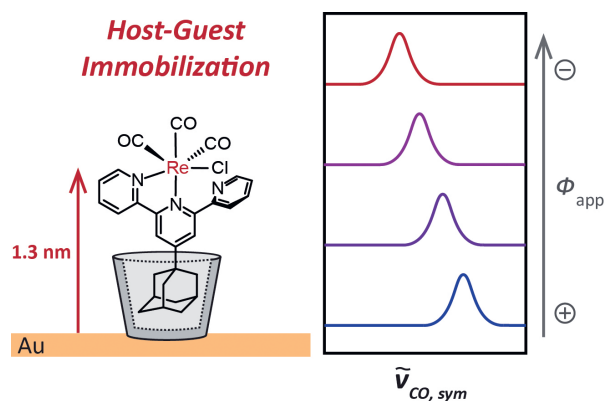
Isik Tuncay, Tzu-Chin Chang Chien, Florian Keller, Helena Roithmeyer, Laurent Sévery, Olivier Blacque, Marcella Iannuzzi, Murielle F. Delley*, and S. David Tilley*

J. Am. Chem. Soc. **2026**, *148*, 330,
<https://doi.org/10.1021/jacs.5c12957>
University of Basel and University of Zurich, Switzerland

Tilley and coworkers investigated how host–guest interactions affect electronic communication between a rhenium tricarbonyl complex and a gold electrode. A perthiolated β -cyclodextrin host was used to immobilize the complex using an adamantane unit as an anchor. Surface-enhanced infrared absorption spectroscopy (SEIRAS) and density functional theory (DFT) calculations were employed to characterize the system. SEIRAS revealed a distinct vibrational signature for the host–guest complex on gold, showing a red shift compared to physisorbed species. DFT calculations indicated that adsorption occurs through adamantane inclusion in the cyclodextrin cavity, yielding a favourable orientation of the rhenium complex toward the liquid medium. Electrochemistry coupled SEIRAS indicated considerable electronic coupling between the host-bound complex and the gold surface despite the large separation (1.2–1.3 nm). DFT revealed that this long-range coupling is mediated by the cyclodextrin. Overall, the study presents host–guest chemistry as an effective strategy to control molecular organization and long-range electronic coupling at electrode interfaces, with potential electrocatalysis applications.

Authors' comments:

“We show that host–guest binding enables considerable electronic coupling to gold electrodes beyond expected distance limits. Our work highlights the potential benefits of this approach for electrocatalysis and the power of SEIRAS to study catalyst–electrode interactions.”



Prepared by Cesare Berton, James Southwell, Titouan Chetot, Stanislav Prytuliak, Fan Liu, Eda Nisli, Deborah Bäcker, Samy Kichou, Dominik Roth, Laura Schüpke, Jan Vetterli, Marc Würsch, Julia Tschudi, Hannah Osthaus, Henrik Braband, and Jason P. Holland*

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Molecular Surface Engineering of Sulfide Electrolytes with Enhanced Humidity Tolerance for Robust Lithium Metal All-Solid-State Batteries

Laras Fadillah, Leonie Braks, Jihoon Oh, Mingliang Liu, Hanna Türk, Davide Tisi, Mounir Mensi, Michele Ceriotti, Jang W. Choi*, and Ali Coskun*

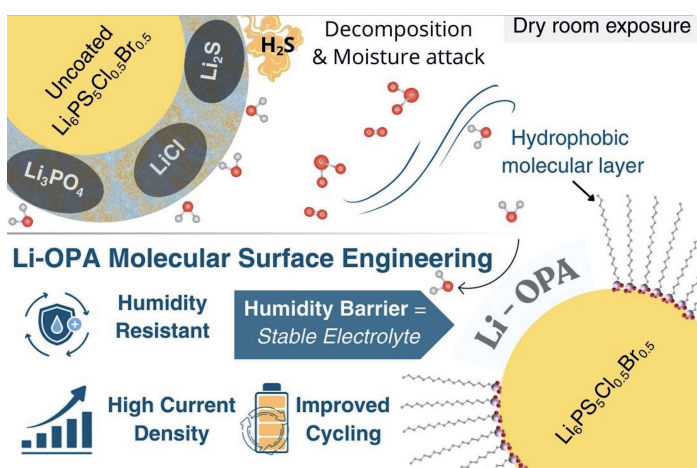
Adv. Mater. **2025**, 38, e15013,
<https://doi.org/10.1002/adma.202515013>

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This paper presents a molecular surface engineering strategy to enhance the stability of sulfide-based solid electrolytes for lithium metal all-solid-state batteries. The authors investigate $\text{Li}_6\text{PS}_5\text{Cl}_{0.5}\text{Br}_{0.5}$ (LPSClBr), an argyrodite-type electrolyte combining high ionic conductivity with pronounced moisture sensitivity and interfacial instability. A single-step surface modification using octadecyl phosphonic acid (OPA) and its lithiated form (Li-OPA) creates a protective organic layer on the electrolyte particles. Spectroscopic analysis combined with DFT calculations reveals stronger interfacial binding for Li-OPA attributed to robust phosphonate coordination with surface lithium or sulfur species. The modified electrolyte exhibits significantly improved dry-room stability while maintaining high ionic conductivity after humidity exposure. Electrochemical measurements show enhanced critical current densities and stable lithium plating/stripping behaviour. In NMC811 full cells, the Li-OPA-coated LPSClBr enables improved cycling stability and Coulombic efficiency. Overall, this work demonstrates that rational molecular surface functionalization provides an effective and scalable route to stabilize sulfide solid electrolytes.

Authors' comments:

"This work shows that molecularly engineered interfaces can simultaneously enhance stability, humidity tolerance, and electrochemical performance of sulfide solid electrolytes for practical all-solid-state lithium metal batteries."



Cethrene's Catch-22: Is Trading Magnetism for Bistability Inevitable?

Pauline Pfister, Daniel Čavlović, Tamara Trajkovic, Olivier Blacque, and Michal Juriček*

Org. Lett. **2025**, 27, 13798,
<https://doi.org/10.1021/acs.orglett.5c04279>

Department of Chemistry, University of Zurich, Switzerland.

In this study, the authors investigated cethrenes as promising candidates for all-organic magnetic photoswitches, which must meet three seemingly not conflicting criteria: a thermally accessible triplet state in the open form, comparable energies of the open and closed forms, and a sufficiently high barrier to ensure bistability. Their data demonstrated that methylnonacethrene met the first two conditions by exhibiting a small singlet–triplet gap and nearly degenerate forms, but no photochemical switching was observed. Instead, irradiation led to partial decomposition. DFT calculations performed in this study yielded a closure barrier of 15.5–18.1 kcal/mol, which was consistent with bistability and confirmed by sharp NMR signals. Although steric effects appeared to resolve the expected compromise, decay pathways in the excited state, competing reactions, or tunnelling likely prevented switching. These results underscored that a deeper mechanistic understanding of this and related systems is essential for the rational design of efficient molecular magnetic photoswitches, a goal that the authors intended to pursue in future work.

Authors' comments:

"The relationship between radical character and bistability represents a classic case of catch-22. In this work, we sought to identify underlying design principles and limitations that could resolve this dilemma and advance the realization of all-organic magnetic switches."

Can it ever switch?

