

17th RISM Seminar

Conjugated polymer photocatalysts for solar water splitting

by Dr. R. Sebastian Sprick



Photocatalytic hydrogen production from water is a research area of immense interest as hydrogen has been identified as a potential energy carrier of the future. Most of the studied photocatalysts are inorganic and organic materials have been far less studied, with the exception of carbon nitride materials. Here, I will present our work on the application of conjugated materials 1-6 as photocatalysts for hydrogen production from water. I will discuss synthetic approaches in tuning the photocatalysts properties to improve photocatalytic activity 6-9 and approaches in making the systems sustainable.

References

- [1] R.S. Sprick, J.-X. Jiang, B. Bonillo, S. Ren, T. Ratvijitvech, P. Guiglion, M.A. Zwijnenburg, D.J. Adams, A.I. Cooper, *J. Am. Chem. Soc.* 2015, 137, 3265.
- [2] V.S. Vyas, B.V. Lotsch, *Nature* 2015, 521, 41.
- [3] R. S. Sprick, Y. Bai, A. A. Y. Guilbert, M. Zbiri, C. M. Aitchison, L. Wilbraham, Y. Yan, D. J. Woods, M. A. Zwijnenburg, A. I. Cooper, *Chem. Mater.* 2019, 31, 305.
- [4] R. S. Sprick, B. Bonillo, R. Clowes, P. Guiglion, N. J. Brownbill, B. J. Slater, F. Blanc, M. A. Zwijnenburg, D. J. Adams, A. I. Cooper, *Angew. Chem. Int. Ed.* 2016, 55, 1792.
- [5] M. Sachs, R. S. Sprick, D. Pearce, S. A. J. Hillman, A. Monti, A. A. Y. Guilbert, N. J. Brownbill, S. Dimitrov, X. Shi, F. Blanc, M. A. Zwijnenburg, J. Nelson, J. R. Durrant, A. I. Cooper, *Nat. Commun.* 2018, 9, 4968.
- [6] X. Wang, L. Chen, S. Y. Chong, M. A. Little, R. Clowes, Y. Yan, M. A. Zwijnenburg, R. S. Sprick, A. I. Cooper, *Nat. Chem.* 2018, 10, 1180.
- [7] R. S. Sprick, C. M. Aitchison, E. Berardo, L. Turcani, K. E. Jelfs, M. A. Zwijnenburg, A. I. Cooper, *J. Mat. Chem. A* 2018, 6, 11994.
- [8] C. M. Aitchison, R. S. Sprick, A. I. Cooper, *J. Mat. Chem. A* 2019, 7, 2490.
- [9] R. S. Sprick, L. Wilbraham, Y. Bai, P. Guiglion, A. Monti, R. Clowes, A.I. Cooper, M. A. Zwijnenburg, *Chem. Mater.* 2018, 30, 5733.

Dr. R. Sebastian Sprick obtained his PhD in 2013 from The University of Manchester developing catalytic systems and their application in the synthesis of organic field-effect transistors in particular polytrarylamines. He moved to the University of Liverpool to pursue postdoctoral work in the area of conjugated microporous polymers initially working on solution processible materials. He then focused on using the extended conjugation of these materials by studying their ability to act as photocatalysts for water splitting. He was promoted to a Research Lead position within the same group leading a team that worked on solar water splitting used a range of organic photocatalysts. He joined the Department of Pure and Applied Chemistry at the University of Strathclyde in June 2020 as an independent researcher with the goal of developing scalable systems for environmental applications initially particularly focusing on solar fuels generation and pathogen inactivation.