

Technical University of Denmark



## Materials for Catalysis, Synthetic Fuels and Chemical Energy Conversion

**Joya, Khurram Saleem; Kammer Hansen, Kent; Holtappels, Peter**

*Published in:*  
Book of Abstracts Sustain 2017

*Publication date:*  
2017

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Joya, K. S., Kammer Hansen, K., & Holtappels, P. (2017). Materials for Catalysis, Synthetic Fuels and Chemical Energy Conversion. In Book of Abstracts Sustain 2017 [C-1]

## DTU Library

Technical Information Center of Denmark

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

## Materials for Catalysis, Synthetic Fuels and Chemical Energy Conversion

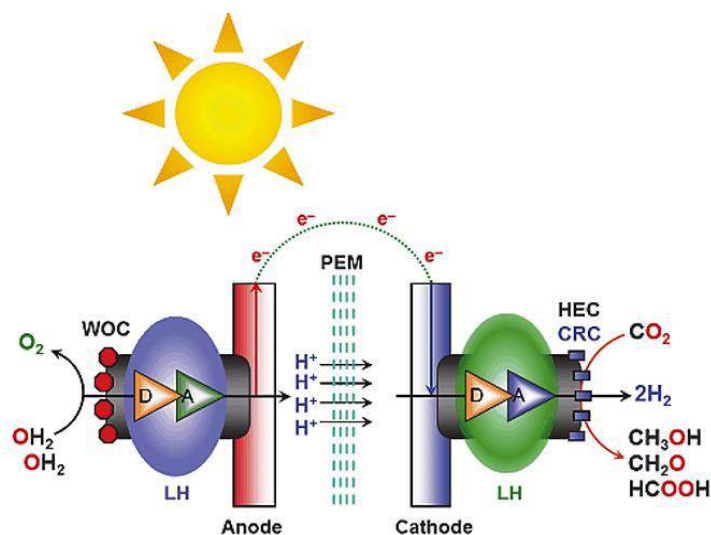
**Khurram Saleem Joya**<sup>\*1,2</sup>, Kent Kammer Hansen<sup>1</sup> and Peter Holtapels<sup>1</sup>

1: Department of Energy Conversion and Storage, Technical University of Denmark (DTU), Frederiksborgvej 399, 4000 Roskilde, Denmark

2: Department of Chemistry, University of Engineering and Technology, GT Road 54890 Lahore, Pakistan

\*Corresponding author email: [khsa@dtu.dk](mailto:khsa@dtu.dk), [khurramdtu@gmail.com](mailto:khurramdtu@gmail.com)

Functional thin-film nanomaterials are becoming increasingly significant for many important applications in industry, for essential catalytic processes and for solar & chemical energy conversion schemes.[1,2] In this pursuit, developing robust and high activity electrocatalytic materials for water oxidation and CO<sub>2</sub> conversion, and their synergistic interfacing with competent light-harvesting modules is very important to progress the construction of solar to fuel conversion system.[3] We have exploited various functional nanoscale materials for catalytic water splitting, CO<sub>2</sub> reduction, and recently for biomass catalysis and solar energy conversion.[3,4] We implemented several molecular, inorganic nanomaterials and metal-oxides displaying great potential to be used in electrocatalysis. Their effective interfacing with semiconductor photo-responsive materials and/or CO<sub>2</sub> reduction systems can provide a potential scheme to make renewable energy supplies.[5] Further we are also exploring catalysis for biomass conversion into chemicals and synthetic fuels opening new ventures for chemicals and energy conversion.



**Figure 1.** Proposed solar-driven device for catalysis, synthetic fuels and chemical energy conversion.

### References

- [1] K. S. Joya, Y. F. Joya, K. Ocakoglu, R. van de Krol, *Angew. Chem. Int. Ed.*, 52 (2013) 10426–10437.
- [2] K. S. Joya, Y. F. Joya, H. J. M. de Groot, *Adv. Energy Mater.*, 4 (2014) 1301929.
- [3] M. de Respinis, K. S. Joya, H. J. M. De Groot, F. D'Souza, W. A. Smith, R. van de Krol, B. Dam, *J. Phys. Chem. C*, 119 (2015) 7275–7281.
- [4] K. S. Joya, H. J. M. de Groot, *ACS Catal.* 6 (2016) 1768–1771.
- [5] K. S. Joya, N.K. Subbaiyan, F. D'Souza, H. J. M. de Groot, *Angew. Chem. Int. Ed.*, 51 (2012) 9601–9605.