

Design and synthesis of highly efficient fuel cell catalysts

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The proton exchange membrane fuel cells (PEMFCs), which use exclusively platinum-based catalysts, are promising electric power for developing electric vehicles. However, the main obstacle for commercializing fuel cell electric vehicles (FCEVs) consists in the limited resource of platinum group metals widely and the high price of catalysts. The exploring highly efficient catalysts presents the frontier of PEMFC research and the most challenging topics in electrocatalytic field. We have focused in recent years the structural design and controlled synthesis of electrocatalysts applied in both anode and cathode of PEMFCs. For the main objective for the anode catalysts is to enhance the performance, while for the cathode the exploring non-precious metal catalysts is conducted since about 90% Pt metal loaded in the cathode of PEMFCs due the sluggish of oxygen reduction reaction (ORR). The recent progresses on both anode and cathode catalysts towards PEMFCs applications will be reported.

References:

- [1] Tian, N. et al. *Science* 2007, 316, 732.
- [2] Tian, N.; et al. *J Am Chem Soc*, 2010, 132, 7580.
- [3] Zhou, Z.-Y. ; et al. *Angew Chem Int Ed*, 2010, 49, 411.
- [4] Zhou, Z.-Y. ; et al. *Chem Soc Rev*, 2011, 40, 4167.
- [5] Xiao, J.; et al. *J Am Chem Soc*, 2013, 135, 18754.
- [7] Yu N.-F. ; et al. *Angew Chem Int Ed*, 2014, 53, 5097.
- [8] Wang, Y. C.; et al. *Angew Chem Int Ed*, 2015, 54, 9907.
- [9] Zhang, B.-W.; et al. *Nano Energy* 2016, 19: 198.
- [11] Wang, Y. C.; et al. *ACS Energy Lett*, 2017, 2, 645.
- [12] Tian, N. et al. *Electrochem Energy Rev*, 2018, 1: 54.
- [13] Yu, N.; et al. *ACS catalysis*, 2019, 9: 3144.