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Design and synthesis of effective catalyst for selective methane oxidation to valuable oxygenated products

Abstract:

Selective partial oxidation of methane to valuable oxygenated products remains a great challenge, as typically over oxidation of oxygenated products to CO_x is observed. Weak oxidative species on the catalyst surface have a great potential to overcome this limitation. However, weak oxidative species usually have low concentrations and are easily decomposed. We found some transition metal oxide and zeolites-based catalysts can realize excellent methane oxidation to methanol and methyl hydroperoxide in pure water, under simulated solar light by in situ generated H₂O₂ or OH free radical at room temperature and pressure. The selectivity for methanol product is up to 98% on these catalysts. Further studies on the reaction mechanism indicate that vacant or metal species on the catalyst surface play an essential role to generate oxidative species and suppress over oxidation of methanol.

Biography

Songmei Sun has completed her PhD from Shanghai Institute of Ceramics, Chinese Academy of Science in 2010. She had been an associate professor in Kyushu University and a Marie Skłodowska-Curie research fellow in Cardiff University between 2016~2020. She is now a full professor at Donghua University. She has published more than 90 papers in reputed journals and these papers have been cited more than 8000 times.