Yongdan Li received his Ph.D. degree in 1989 from Industrial Catalysis Program of Tianjin University, China, with Professor Liu Chang. He spent one year in the University of Twente as a visiting researcher and one and half a year in DCPR-ENSIC of INPL in Nancy as a post-doc. After that he got an associate professorship in Tianjin University and after another year, he was promoted to a full professor there. He served as the Chair of the Industrial Catalysis Program and the Chairman of the Department of Catalysis Science and Technology in Tianjin University until 2017. In June 2017, he was appointed as the Tenured Chair Full Professor of Industrial Chemistry at the School of Chemical Engineering, Department of Chemical & Metallurgical Engineering of Aalto University, Finland. His track records include: Making up the fundamental framework for the characterization and optimization of mechanical strength of commercial porous catalyst which helped Chinese chemical industry in the 80-90's of last century to get rid of the plant shutdowns due to catalyst mechanical failure; Proposing the simultaneous production of CO-free hydrogen and nano-carbon from methane catalytic decomposition as a process; Achieving the complete decomposition of Kraft lignin to small molecules with catalytic ethanolysis. He has made contributions also to the development of non-aqueous redox flow battery, solid oxide fuel cell, catalytic combustion of hydrocarbons, and hydrogen production via hydrocarbon reforming, CO water-gas shift and solar driven water-splitting.

Recent works on the membrane for non-aqueous redox flow battery and the challenges

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Abstract: Redox flow battery (RFB) stands out as a promising energy storage technology owing to its independent power and energy features, long cycle life, and rapid response. Compared with the aqueous RFBs, the non-aqueous RFBs (NARFBs) have received increasing attention because of their wider electrochemical window and thus higher energy density. However, the performance of NARFBs has been insufficient for commercialization, the lack of high ionic selectivity and ionic conductivity membrane is one of the key limiting factor. To improve the performance and efficiency, many novel membranes have been developed subsequently. In my group, we synthesized a two-dimensional (2D) metal organic framework (MOF) modified Celgard membrane via an infiltration method and achieved 82% EE at a current density of 12 mA cm^{-2}. We also synthesized 2D vermiculite nanosheets modified porous membrane and achieved 85.8% EE at 2 mA cm^{-2}. Furthermore, we proposed to utilize an intrinsic composite membrane to enhance the performance of the battery. For instance, we developed a novel highly selective MOF-based mixed-matrix membrane and a porous poly(vinylidene fluoride) membrane with 2D vermiculite nanosheets.

Keywords: Non-aqueous redox flow battery, Membrane, Metal organic framework, Two dimensional materials