2nd Asia-Pacific Conference on Plasma Physics, 12-17,11.2018, Kanazawa, Japan

Atmospheric-pressure cold plasma assisted ruthenium catalyst for carbon dioxide hydrogenation

Weiwei Xu, Jingsen Zhang, Lanbo Di, Xiuling Zhang
College of Physical Science and Technology, Dalian University
xiulz@sina.com

In recent years, with the decrease of fossil fuels, more and more people are looking for new “green” sources of fuels. One of them is to decompose the main component of greenhouse gases, carbon dioxide, used physical and chemical method, and converting it into an easily storable synthetic fuel, which is the most attractive research in recent years. The traditional methods of decomposition and conversion of carbon dioxide are usually thermal decomposition, photocatalysis and electrochemical methods, but they still have low conversion efficiency. Plasma-assisted catalytic material decomposition and conversion of carbon dioxide is an effective way. The use of DBD cold plasma can achieve carbon dioxide decomposition and transformation under normal temperature and pressure conditions. In a coaxial quartz glass DBD reactor, the plasma, high-energy, undergoes inelastic collisions with reactive gas molecules, activating gas molecules and dissociating. In the conversion of carbon dioxide hydrogenation, Ru has good catalytic activity in the selectivity of methane and formic acid, and the ruthenium catalyst also has the advantages of good stability and resistance to accumulate carbon. The selected Ru-based catalyst shows higher reactivity in the plasma environment, and therefore can effectively increase the conversion efficiency of carbon dioxide and adjust the selectivity of the product.

Acknowledgements
This work is supported by National Natural Science Foundation of China (Grant No. 21673026, 21773020, 11505019).