

Fuel reforming for fuel cell application

Cyber Hung Tak Cheong and Yeung King Lun, Department of Chemical Engineering, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, PR China

Fossil fuels, such as natural gas, petroleum, and coal are currently the primary source of energy that drives the world economy. However, fossil fuel is a non-renewable and non-sustainable source of energy that is rapidly being depleted. The heavy reliance on fossil fuels is the main reason for today's environmental problems. Acid rain, ozone depletion and global climate change had been linked to burning of fossil fuels. Alternative clean energy platform based on renewable energy source and efficient fuel cell system could alleviate the worsening energy and pollution problems. This work describes a catalytic system for direct conversion of glucose to methanol for use in a direct-methanol fuel cell (DMFC). Glucose is attractive fuel since it can be produced from agricultural waste products. Also, unlike methanol, glucose is safer and more easily transported making it a suitable fuel for portable micro fuel cell. Platinum and nickel-based catalysts on microporous, mesoporous and macroporous supports were investigated. Platinum supported on macroporous silica gave the highest conversion with good selectivity for methanol. Addition of nickel catalyst suppresses coke formation during the reaction. Further selectivity improvement is necessary to limit the production of higher alcohols (i.e., mainly ethanol and diols).