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Application of Carbon and Metal Based Catalysts for the Utilization of Carbon Dioxide and Bio-waste to Get Renewable Energy**Manawadevi Y. Udugala-Ganeheneg**

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Magnetic and electrochemical studies of face-to-face arranged, tetraaza-macrocyclic homo-bimetallic (Metal= Ni, Cu) complexes revealed a significant affinity towards halide ions, and an interesting metal-metal interaction through a halide bridge. With an intention for finding a solution to reduce the environmental pollution caused by CO₂ emission, I studied the ability of these metal complexes to utilize CO₂ electrochemically. The outcome of this attempt ultimately revealed that these complexes were better electro-

catalysts for the conversion of very inert CO₂ into useful chemicals such as carbonates and oxalates.

By integrating the knowledge on electrocatalytic activity of these metal complexes to utilize CO₂, a novel Al³⁺, Fe³⁺ modified graphene oxide composite (GO) was synthesized with an intention to apply it as a heterogeneous catalyst for the pre-esterification of the bio-oil containing a high level of free fatty acids (FFA). These GO composite had shown a very efficient capacity for the pre-esterification of FFA. It showed 92.72 % conversion of stearic acid into methyl stearate and 95.37 % reduction of FFA content of *Calophyllum inophyllum* oil. The conversion was conducted under mild reaction conditions. The optimum catalytic dose, reaction time and temperature employed were of 8% (wt.),

3 h and 65 °C, respectively. The catalyst could be easily recovered and reused more than four cycles, effectively. The subsequent employment of pre-esterified *Calophyllum inophyllum* oil produced biodiesel with 86% yield without encountering unnecessary soap formation.

Biography

Prof. Manawadevi Y. Udugala-Ganeheneg has completed her PhD in 2000 from Wayne State University (WSU), Michigan and postdoctoral studies from Monash University School of Chemistry in Australia. She is currently a professor in Inorganic Chemistry of University of Peradeniya, Sri Lanka. Her main research interest is on utilization of carbon dioxide and bio-waste for renewable energy. She has received numerous prestigious fellowships and awards for her academic excellence and research, including 2000 Esther and Stanley Kirshner Graduate Award and 1995-Thomas Rumble Fellowship from WSU, 2011- Endeavour Awards from Australian government, and 2016 and 2017 Presidential Awards from Sri Lankan government.

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