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## Catalytic upgrading of HTL bio-oil using bio-Pd/C catalyst

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With the depleting oil reserves and the increasing demand worldwide for the transportation of fuels and chemicals, the need for an alternative fuel source is becoming increasingly apparent. Bio-oil is produced through fast pyrolysis or hydrothermal liquefaction routes. But the produced bio-oil has high oxygen content, leading to a low heating value and lower stability over the time. Hence, methods to upgrade bio-oil to make it more closely resemble the crude oil are urgently sought. Catalytic hydro-treatment is one of the most promising technologies for Hydrothermal Liquefaction (HTL) and upgrading biofuel. In the current study, HTL bio-oil produced from *Chlorella* microalgae slurry in a continuous flow reactor was hydro-treated with bio-Pd/C. Bio-Pd/C uses metallic NP-decorated whole bacterial cells as chemical catalysts and the activity of the Bio-Pd/C catalyst was evaluated against commercial Pd/C. The upgrading potential of the bio-Pd/C was investigated under three variables: Time, temperature and oil to catalyst ratio in a stirred reactor. Both catalysts Pd/C and bio-Pd/C showed similar activity under similar upgrading condition. Oxygen and nitrogen content were reduced by 65% and 35%, respectively, at 325°C in 4 h reaction time. Further analysis of upgraded oil by GC-MS, Sim-Dist, and elemental analysis attributed to the improvement in the fuel properties of bio-oil. Catalyst analysis with ICP-MS, TGA and elemental analyzer attributed that the biomass from bio-Pd/C contributed to bio-oil yield.

### Biography

Joseph Wood has completed his BEng degree in Chemical Engineering at Loughborough University, UK and PhD in Chemical Engineering at the University of Cambridge (2001). He has 3 years of Industrial Experience with "BP" and "Albright and Wilson". Since 2001, he has been working at the University of Birmingham, where he was earlier the Chair of Chemical Reaction Engineering Group in the School of Chemical Engineering. He has published 72 journal papers and 4 book chapters.

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