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PREFACE

Preface

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Energy transformation and associated climate change are one of the greatest challenges facing mankind this century, and inextricably linked to population growth, poverty and public health. The global energy economy is evolving rapidly, reflecting, e.g., the popular uptake of commercial hybrid motor vehicles and domestic solar heating, development of combined heat and power plants and renewable wind, and spread of renewable wind, wave and geothermal technologies. Biofuels are one class of alternative energy technology that has already realized significant potential in the drive towards sustainable transportation policies, particularly within the Americas, where annual bioethanol production (derived from cereal and sugar crops) is now in the billions of gallons. Despite considerable recent controversy regarding the "food versus fuel" debate, there is no doubt that biofuels derived from appropriately sourced and managed plant crops will continue as important transportation fuel, either in their own right or as diesel or gasoline additives. Hence, it is crucial that their corresponding energy balances are maximised through innovative chemistry and engineering solutions.

This Special Issue focuses on the production of biodiesel, a class of biofuels that are clean-burning, non-toxic fuel obtained from plant oils, animals fats, or waste cooking oils. Biodiesel is generally produced by the transesterification of plant triglycerides from cereal and non-food crops with short-chain alcohols, and its usage has been incorporated into governmental transportation strategies across Europe, the US, India, and Southeast Asia. Existing, large-scale commercial biodiesel ventures employ homogeneous solid base catalysts to drive transesterification in energy intensive operations, however more efficient heterogeneous catalyst systems have been recently developed and form the basis for the articles herein. Sustainable biodiesel production is possible through appropriate feedstock selection, and there is great interest in "super crops," such as *Jatropha curcas* whose poisonous seeds are rich in triglycerides, that grow readily on wasteland throughout developing countries, require minimal cultivation, and do not compete with traditional agricultural land use or cause deforestation. Conversely, the spread of palm oil plantations for biodiesel synthesis across Malaysia and Indonesia may harm global biodiversity and actually contribute to global warming.

The design and application of heterogeneous acid and base catalysts for energy efficient biodiesel production has now progressed to the stage where they can effectively compete, on both a cost and emission basis, with current homogeneous technologies. The confluence of these scientific and technological advances, with ongoing environmental and political debate over the future of biofuels and their green credentials, makes this issue particularly timely, and we would like to express our gratitude to the contributors, referees and Professor Sir John Meurig Thomas (Founding Editor).

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