

# Renewable Energy and Resources & Energy Materials and Fuel Cell Research

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## Controlled selectivity via kinetic resolution with transient operation

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A transient operation has been previously considered in many industrial processes where either heat recovery or production rate can be considerably improved as compared to steady-state operation. The effect of periodic temperature oscillations has been studied in the hydrogenation and isomerization of D-glucose over a supported Ru-catalyst in a micro trickle bed reactor. It was found that the preferred reaction pathway depends on the frequency of periodic temperature oscillations. The catalyst based on ruthenium nanoparticle supported over hypercrosslinked polystyrene was tested in the reaction of hydrogenation/isomerization of glucose and maltose under radiofrequency heating in a continuous flow fixed bed reactor. The catalytic activity and selectivity were investigated under the steady-state and transient operation reactor modes. The transient operation of periodic temperature oscillations with a low amplitude of 14 °C showed a dramatic change in the reaction pathway altering the preferential reaction from hydrogenation to isomerization for both substrates studied. The period of temperature oscillations affects the hydrogen coverage which can determine the main reaction which takes place. The data shows that the transient operation mode could have a high impact on biorefinery because fructose is one of the main feedstocks for 5-hydroxymethylfurfural and other valuable compounds in the field. Moreover, the work demonstrates that a concept of a superior product selectivity achieved by introducing transient operation, which can likely be applied to other reaction classes and processes.

### Biography

Dr Javier Fernandez-Garcia studied his bachelor (2002-2007) and master's degree (2010-2011) in Spain. He worked in industry from 2007 to 2014 in companies such as Saint-Gobain, XSTRATA, Biogas Fuel Cell and HUNOSA. He completed his PhD at University of Oviedo (2011-2014). After that he worked as a Research Fellow at University of Warwick from 2014 to 2016. Then he developed research activities in Stoli Catalysts Ltd (Spin-out company) and he was finally appointed as Lecturer in Chemical Engineering at University of Leeds in 2017.

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