

Title: Engineering porous solids for a sustainable energy future

Abstract:

The worldwide primary energy consumption, although decelerated due to the economic global crisis, continues growing year by year, with an increase of 2.5% in 2011. The current energy system is mostly based on fossil fuels, which have led to an increase in global warming gas emissions. As a result, the concentration of CO₂ in the atmosphere and in the oceans keeps increasing, leading to a global temperature rise and to water acidification, respectively. Most of the global warming over the past 50 years is very likely to have been caused by emissions of carbon dioxide (CO₂) and other greenhouse gases (GHG) derived from human activities. Without any action to reduce these emissions, the global average temperature is likely to rise further by 1.8-4 °C this century, and by up to 6.4 °C in the worst case scenario. These are the greatest environmental, social and economic threats mankind is facing nowadays.

Combating climate change is a key priority for the European Commission who has agreed on three common objectives for tackling today's energy and climate challenges, the so-called "3x20": reduce greenhouse gas emissions and energy use both by 20%, and achieve a 20% of renewable energy in the supply chain by 2020. These efforts are aimed to facilitate the transition to sustainable energy sources and to mitigate global warming associated with the massive utilization of fossil fuels. In order to address these challenges, new nano-structured materials are going to play a pivotal role.

During my talk I will summarize our last advances in the rational design of nano-structured materials (membranes, adsorbents and catalysts) based on zeolites, metal organic frameworks and structured polymers for different key applications aimed to solve short, medium and long term energy challenges, from CO₂ separation to new catalysts for syngas chemistry and methane activation. ¹⁻⁵

References

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Bio:

Jorge Gascon (Spain, 1977) received his MSc. in Chemistry in 2002 and his PhD cum laude in Chemical Engineering in 2006, both at the University of Zaragoza (Spain). He was post-doc (2006 to 2009), Assistant Professor (2010 to 2012) and Associate Professor (2012 to 2014) at TUDelft. Since 2014 he is Antoni van Leeuwenhoek Professor of Catalysis Engineering at the same university.

Gascon's research interests fall at the interphase of Chemical Engineering and Materials Science, including the development and demonstration of new nano-structured materials and composites. Applications comprise membrane and adsorbent development, multifunctional catalysis, Fischer Tropsch Synthesis, Methanol to olefins and photo-catalysis. He has co-authored over 150 publications in peer-reviewed journals (current H index is 40), several book chapters, 7 patents and has edited the book 'Metal Organic Frameworks as Heterogeneous Catalysts'. He has been the recipient of the prestigious VENI (2010), VIDI (2013) and ERC Starting (2013) personal grants. He received the 2013 ExxonMobil Chemical European Science and Engineering Award.