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## CARES Visiting Scientists Seminar Series:

Scalable gas-phase synthesis of functional nanoparticles based on a detailed understanding of precursor chemistry and particle growth

Prof. Dr. Christof Schulz, University of Duisburg-Essen

Thursday 25th Feb, 5.30—6.30pm

CREATE Seminar Room, Level 2, CREATE Tower

Followed by an informal drinks reception.

Please register at <http://whoozin.com/KAP-HAC-UK49>

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**Abstract:** Gas-phase synthesis of nanoparticles allows to generate high purity materials with well-controlled properties in continuous flow situations that provide a chance for scale-up to industrial scale. Nanoparticles with well-controlled composition and narrow size distributions are of interest for a wide variety of applications from coatings to electronics to functional materials, e.g., for energy conversion and storage. For the synthesis of materials with desired properties, however, the reaction conditions must be well controlled and the underlying processes understood. The decomposition kinetics of vaporized metal organic compounds, the ignition properties of the mixture of these materials with oxidizing environments as well as the reaction mechanisms of the decomposition, cluster formation and the potential interaction with flame chemistry is a prerequisite for a targeted synthesis of materials. Kinetics experiments are carried out in shock tube reactors with optical and mass spectrometric detection of intermediate and product species, and in flow reactors with laser-based detection of temperature and species concentration. At the same time, reaction conditions such as temperature, intermediate species concentration and particle size must be determined *in situ* in lab-scale nanoparticle reactors as well as in pilot-plant-scale reactors to provide input and validation data for numerical simulation. In this presentation these aspects will be introduced based chemical kinetics measurements in shock tubes and the investigation of particle formation and growth in flow reactors using molecular beam sampling and laser based measurements of temperature and intermediate species concentrations.



**Biography:** Prof. Dr. Christof Schulz holds the Chair for Combustion and Gas Dynamics at the University of Duisburg-Essen where he currently leads a group of 45 scientists. In 2014 he received the Leibniz Prize of the German Research Foundation, DFG. He is currently a scientific director of the Institute for Energy and Environmental Technology (IUTA) in Duisburg and the director of the NanoEnergyTechnologyCenter (NETZ). He is member of the board of the German Section of the Combustion Institute and of the board of the international Combustion Institute.

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