

4th International Symposium Gas-Phase Synthesis of Functional Nanomaterials: Fundamental Understanding, Modeling and Simulation, Diagnostics, Scale-up and Application

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Please note:

Keynote presentation: up to 25 min. + 5 min. for discussions
Oral presentation: up to 15 min. + 5 min. for discussions
Short poster introduction: 2 min. to present a single-slide summary of your poster
(Posters will then be presented in detail in individual zoom rooms throughout the entire conference, details coming soon)

Tuesday, October 6, 2020, 3–7 pm (Duisburg/CEST)

Fundamentals of Particle Formation and Growth

(Chairs: Christof Schulz, Hartmut Wiggers)



Session 1 | 3–5 pm

Welcome

Christof Schulz (University of Duisburg-Essen)

Reactions of iron-containing precursors for nanoparticles in synthesis flames

Tina Kasper, Yasin Karakaya, Munko Gonchikzhapov
(University of Duisburg-Essen, Germany)

Gas-phase synthesis of metal sulphide nanoparticles

Adithya Balakrishnan, Jan Derk Groeneveld, Suman Pokhrel, Lutz Mädler
(University of Bremen, Germany)

Flame synthesis of carbon metal-oxide nanocomposites in a counterflow flame

Yihua Ren (RWTH Aachen University, Germany)

Short poster introduction

Thermal and chemical structure of SpraySyn Flame

Munko Gonchikzhapov (University of Duisburg-Essen, Germany)

Thermophoretic particle sampling on TEM grids with high spatial accuracy

Frederik Kunze (IUTA – Institute for Energy and Environmental Technology e.V., Germany)

Influence of differing nozzle configurations on the final particle characteristics and particle structure evolution in spray flames

Ricardo Tischendorf (University of Paderborn, Germany)

Properties of carbon nanoparticles formed premixed stagnation flames with flame temperatures greater than 2100 K

Shruthi Dasappa, Joaquin Camacho (San Diego State University, USA)

Flame-made high-surface mixed oxide catalysts for gas phase oxidations

Felix Spranger (Technical University of Dresden, Germany)

Spray-flame synthesized $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ electrolyte for solid state batteries

Md. Yusuf Ali (University of Duisburg-Essen, Germany)

Process design for gas phase synthesis of nickel nanoparticles

M. Reza Kholghy¹, A. Schumann², Sotiris E. Pratsinis² (¹Carleton University, Canada, ²ETH Zurich, Switzerland)

Session 2 | 5pm–7pm



Thermodynamic phase stability and selectivity in combustion synthesis of metal oxide nanoparticles

Keynote: Hai Wang (Stanford University, USA)

Classical nucleation process for flame-formed manganese oxide nanoparticles

Joaquin Camacho (San Diego State University, USA)

Unravelling the thermal decomposition of aluminum tris(acetylacetonate) in the gas-phase with vacuum ultraviolet (VUV) photoionization mass spectrometry

Sebastian Grimm, Tina Kasper, Burak Atakan (University of Duisburg-Essen, Germany)

Inline functionalization of silicon nanoparticles in a plasma reactor

Malini Dasgupta, Paolo Fortugno, Hartmut Wiggers (University of Duisburg-Essen, Germany)

Defects & vacancies in FSP-made nanoparticles: lattice integrity, energy states & impact on catalytic efficiency

Yiannis Deligiannakis (University of Ioannina Greece)

Wednesday, October 7, 2020, 3–7 pm (Duisburg/CEST)

Modeling and Simulation

(Chairs: Andreas Kempf, Irenäus Wlokas)



Session 1 | 3–5 pm

Assessment of the generality of computational fluid dynamics models for simulating flame spray synthesis of nanoparticles

Jan Hendrik Cloete¹, C. Fernández Acevedo², C. Salazar Castro², Shahriar Amini¹ (¹SINTEF Industry, Norway, ²Centro Tecnológico Lurederra, Spain)

Development and evaluation of a chemical kinetics reaction mechanism for tetramethylsilane-doped flames

Hossein Janbazi, Yasin Karakaya, Tina Kasper, Christof Schulz, Irenäus Wlokas, Sebastian Peukert (University of Duisburg-Essen, Germany)

Thermophysical properties and reactions in precursor solutions for the production of nanoparticles

Maximilian Kohns¹, Alexander Keller¹, Irenäus Wlokas², Hans Hasse¹ (¹University of Kaiserslautern, ²University of Duisburg-Essen, Germany)

Variable parcel sizes in DSMC-simulation of surface reactions in mesoporous structures formed by flame spray pyrolysis

Sangita Swapnasrita, Lutz Mädler (University of Bremen, Germany)

Short poster introduction

Thermochemistry of organosilane compounds and organosilyl radicals

Hossein Janbazi (University of Duisburg-Essen, Germany)

Experimental and numerical investigation of iron-doped flames: FeO formation and impact on flame temperature

Monika Nanjaiah (University of Duisburg-Essen, Germany)

Modeling of the heating and evaporation of a single precursor solution droplet in convective environments

Praveen Narasu (Heidelberg University, Germany)

Nanoparticle dynamics modeling of silicon nanoparticle formation during flame-spray pyrolysis: A comparison of three solution methods

Johannes Sellmann (University of Duisburg-Essen, Germany)

Formation and growth of carbonaceous nanoparticles by reactive molecular dynamics

Akaash Sharma (University of Melbourne, Australia)

Investigating the optical properties of few-layer graphene using discrete dipole approximation

Sina Talebi Moghaddam (University of Waterloo, Canada)

CFD modeling of combustion in anoxic flame spray pyrolysis

Dimitrios Deligiannakis (Aristotel University of Thessaloniki, Greece)

Session 2 | 5pm–7pm



Uncovering hydrolysis kinetics of TTIP through atomistic-scale simulations

Keynote: Matthias Ihme (Stanford University, USA)

Population balance modeling of soot formation in laminar and turbulent flows

Stelios Rigopoulos, Binxuan Sun, Anxiong Liu, Daniel O'Sullivan
(Imperial College London, UK)

Nanoparticle formation in premixed and non-premixed flame–vortex interactions

Luis Cifuentes, Johannes Sellmann, Irenäus Wlokas, Andreas Kempf
(University of Duisburg-Essen, Germany)

Defect engineering of [ZrO_{2-x}] by anoxic flame spray pyrolysis (A.F.S.P)

Asterios Mantzani (University of Ioannina)

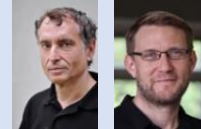
Nucleation and coalescence of incipient soot by reactive molecular dynamics

Eirini Goudeli¹, Akaash Sharma¹, Khaled Mosharraf Mukut², Somesh P. Roy²
(¹University of Melbourne, Australia, ²Marquette University, USA)

Thursday, October 8, 2020, 3–7 pm (Duisburg/CEST)

Diagnostics

(Chairs: Thomas Dreier, Torsten Endres)



Session 1 | 3–5 pm

Absolute iron atom concentration imaging in nanoparticle flame-synthesis using self-calibrating laser-induced fluorescence

Sergey Cheskis (Tel Aviv University, Israel)

On-line elemental analysis of nanoparticle synthesis by laser-induced breakdown spectroscopy in vacuum

Olivier Sublemontier (CEA-Université Paris-Saclay, France)

Study of TiO₂ nanoparticles irradiated by IR laser

Silvana De Iuliis¹, Roberto Dondè¹, Igor Altman² (¹Institute of Condensed Matter Chemistry and Technologies for Energy, Italy, ²Naval Air Warfare Center Weapons Division, USA)

Few layer graphene aerosol: optical properties and in situ diagnostics

S. Musikhin¹, S.T. Moghaddam¹, P. Fortugno², J.C. Corbin³, G.J. Smallwood³, T. Dreier², C. Schulz², K.J. Daun¹ (¹University of Waterloo, Canada, ²University of Duisburg-Essen, Germany, ³National Research Council, Canada)

Short poster introduction

Application of scanning probe microscopies to flame-formed carbon nanoparticles

Mario Commodo¹, Gianluigi De Falco², Andrea D'Anna², Patrizia Minutolo¹
(¹CNR, Combustion Research Institute, ²Università degli Studi di Napoli Federico II, Italy)

Multi-photo induced photoluminescence emission during time-resolved laser-induced incandescence experiments on silver and gold nanoparticles

S. Talebi-Moghaddam¹, S. Robinson-Enebeli¹, J.C. Corbin², A. Klinkova¹, G.J. Smallwood², K.J. Daun¹ (¹University of Waterloo, Canada, ²National Research Council, Canada)

Characterization of tracers for two-color laser-induced fluorescence liquid-phase temperature imaging in sprays

Markus Prenting, Thomas Dreier, Christof Schulz (University of Duisburg-Essen, Germany)

Quantitative SiO mole fraction imaging in SiCl₄-doped premixed laminar flames

Abbas El Moussawi, Torsten Endres, Sebastian Peukert, Thomas Dreier, Christof Schulz (University of Duisburg-Essen, Germany)

The impact of organic carbon on soot light absorption

Georgios A. Kelesidis, Alexander Bruun, Sotiris E. Pratsinis (ETH Zurich, Switzerland)

Phase doppler measurements in spray combustion for nanoparticle synthesis

Malte Stodt (University of Bremen, Germany)

High speed imaging of flame chemiluminescence in SpraySyn burner: flame stability

Sadrollah Karaminejad (University of Duisburg-Essen, Germany)

Session 2 | 5pm–7pm

Intracavity laser absorption spectroscopy diagnostics of gas-phase FeO absorption cross section in a shock tube

Matthieu R. Lalanne⁴, Peter Fjodorow¹, Dong He¹, Monika Nanjaiah¹, Anita Pilipodi-Best², Valery M. Baev³, Sergey Cheskis², Jürgen Herzler¹, Mustapha Fikri¹, Irenäus Wloka¹, Christof Schulz¹, Igor Rahinov⁴

(¹University of Duisburg-Essen, Germany, ²Tel Aviv University, Israel, ³University of Hamburg, Germany, ⁴The Open University of Israel)

Time-resolved laser-induced incandescence characterization on nickel nanoparticles

S. Robinson-Enebeli, S. Talebi-Moghaddam, K.J. Daun (University of Waterloo, Canada)

Simultaneous characterization of droplet size distributions and particle morphology in spray flame synthesis by wide-angle light scattering (WALS)

Simon Aßmann, Bettina Münsterjohann, Franz J.T. Huber, Stefan Will

(Friedrich-Alexander-University Erlangen-Nürnberg FAU, Germany)

Small angle X-ray scattering as measurement technique for fractal structures produced by flame spray pyrolysis

Mira Simmler, Manuel Meier, Julian Ungerer, Hermann Nirschl

(Karlsruhe Institute of Technology, Germany)

Tomographic analysis of gas-phase synthesis processes based on simultaneous multi-color measurements

Khadijeh Mohri, Chau Tyan Foo, Andreas Unterberger, Jan Menser

(University of Duisburg-Essen, Germany)

Friday, October 9, 2020, 3–7 pm (Duisburg/CEST)

Scale-up and Application

(Chairs: Hartmut Wiggers, Christof Schulz)



Session 1 | 3–5 pm

Flame nanoparticle and device engineering for biomedicine

Georgios A. Sotiriou (Karolinska Institutet, Sweden)

Silicon-rich SiN_x nanoparticles for Lithium-ion batteries

Stefan Kilian (University of Duisburg-Essen, Germany)

Spray-flame synthesis of Eu doped Ce/Zr/Gd-oxide nanoparticles for catalytic applications – correlation of macroscopic and microscopic properties

Martin Underberg, Tim Hülser

(IUTA – Institute for Energy and Environmental Technology e.V., Germany)

Flame synthesis of recyclable electrode materials for Li-ion batteries

T. Karhunen, A. Lähde, Jorma Jokiniemi (University of Eastern Finland)



Superior selectivity of gas sensors made by flame spray pyrolysis

Keynote: Sotiris Pratsinis (ETH Zurich, Switzerland)

Session 2 | 5pm–7pm

Morphology, composition and optical properties of jet engine-like soot made by flame spray pyrolysis

Reza Kholghy (Carleton University, Canada)

Gas-phase engineering of tantalum-based photocatalytic nano-ensembles

Constantinos Moularas, Pavlos Psathas, (University of Ioannina, Greece)

Engineering of controlled Cu₂O/CuO nanocatalysts by O₂-lean (anoxic) flame spray pyrolysis

Areti Zindrou (University of Ioannina, Greece)

Fluorescent carbon dots production: A direct flame synthesis approach

Mariano Sirignano¹, Anna Cijolo², Carmela Russo² (¹University of Naples, ²IRC-CNR, Italy)

Process technology for electrochemical functional materials @ UDE

Doris Segets (University of Duisburg-Essen, Germany)

Flame-made TiO₂(B)

Keroles B. Riad¹, Paula M. Wood-Adams¹, Karsten Wegner²
(¹Concordia University, Canada, ²ETH Zürich, Switzerland)