

UNIVERSITÄT
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Offen im Denken

Nanocomposite Powders for Laser Additive Manufacturing

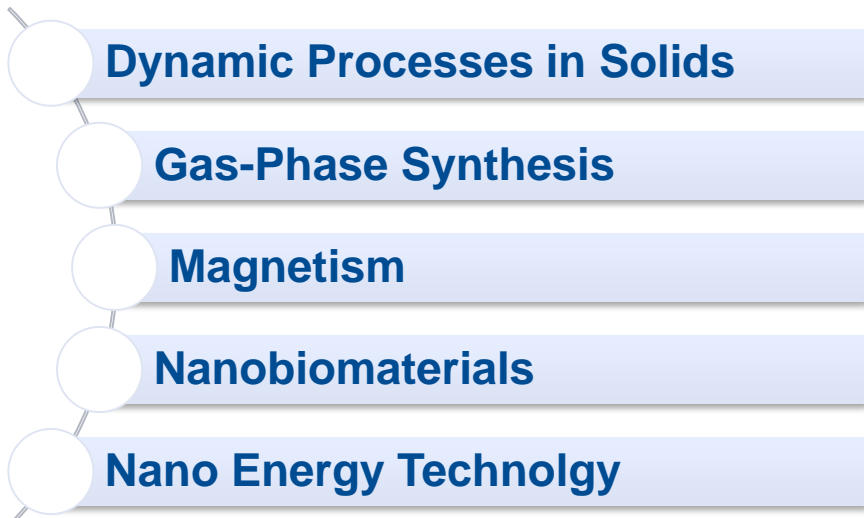
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Successful R&I in Europe, Düsseldorf, March 15, 2018



- Central Scientific Institute of the University of Duisburg-Essen (Germany)
- Represents research in nanoscience and nanotechnology
- More than 70 principle investigators from biology, chemistry, physics, engineering, medicine → *More than 400 researchers*

Main Research Areas



NanoEnergyTechnologyCenter

- Materials for batteries, thermoelectrics, catalysis, photovoltaics, and more
- Cutting-edge research in 36 excellently equipped labs
- Highly-equipped synthesis facility and microscopy center
- Unique research building from competitive funding (46 million EUR)

- FP7 NMP Project: Better Upscaling and Optimization of Nanoparticle and Nanostructure Production by Means of Electrical Discharges (BUONAPART-E)
 - 2012-2016
 - 21 partners
 - Coordinated by University of Duisburg-Essen, Germany
 - 10.4 Mio. € total costs, 7.8 Mio. € EU funding

- H2020 NMP Project: Nanomaterials via Gas-Phase Synthesis: A Design-Oriented Modelling and Engineering Approach (NanoDome)
 - 2015-2018
 - 6 partners
 - Coordinated by University of Bologna, Italy
 - 4 Mio. € EU funding

Nanocomposite Powders for Laser Additive Manufacturing

- Available range of polymer and metal powders for laser-based additive manufacturing (LAM) is extremely limited
 - 95% of all polymer powders are made of polyamide (PA12 or PA6)
 - More than 5,500 metal alloys in use today cannot be additively manufactured
- Majority of powder materials shows insufficient processability
- Using nanoparticles (NPs) as additives for powder materials might increase the variety of available powder materials

- Laser synthesis of colloids
 - No stabilizers or residual chemical precursors (ligand-free)
 - Material and liquid variation
 - Scalable “ready-to-use” colloids for process chain

- Supporting nanoparticles on microparticles
 - Control of nanoparticle deposition by pH value
 - Route applicable to metal, oxide and polymer supports

- Laser-based additive manufacturing
 - NPs do not change flowability of the powder
 - NPs can have significant effect on properties of the built part

Partners seeking:

- Industry/SME with expertise in laser-based additive manufacturing and polymer and metal powders
- Universities/Research institutes with expertise in laser-based additive manufacturing and polymer and metal powders

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