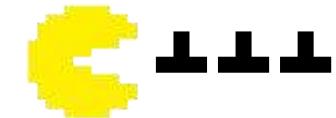




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Particle-strengthened Compositionally Complex Alloys



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E. A. Jägle



G. Dehm

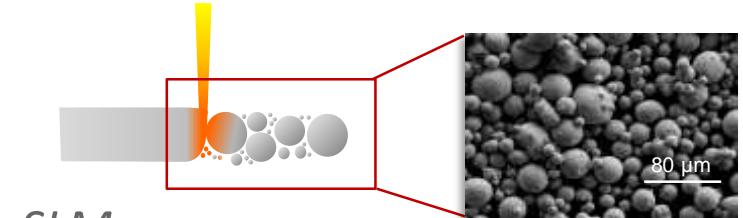
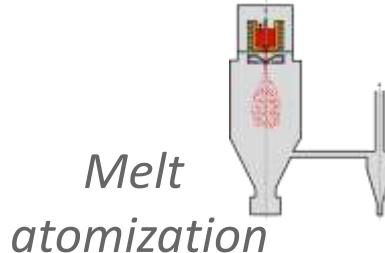


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Motivation and objectives

→ mechanical strengthening of CCA by particle precipitates (p-CCA)

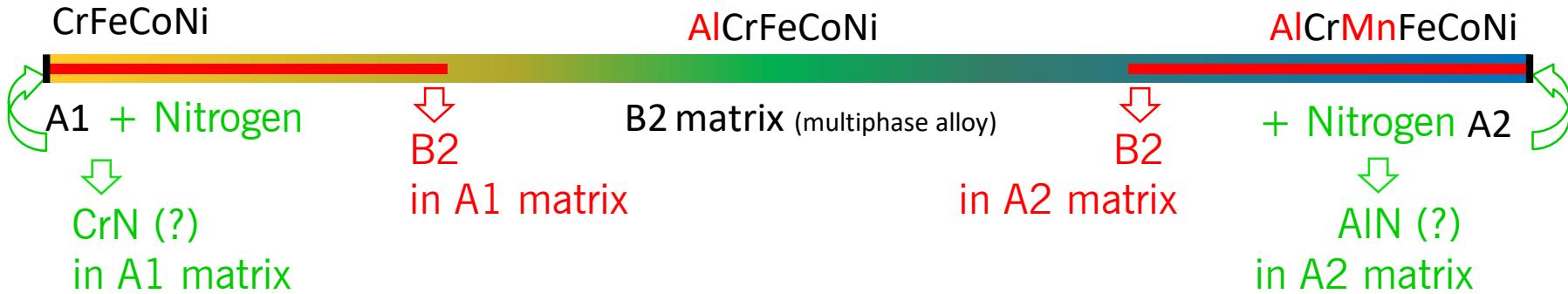
- Synthesis of p-CCA



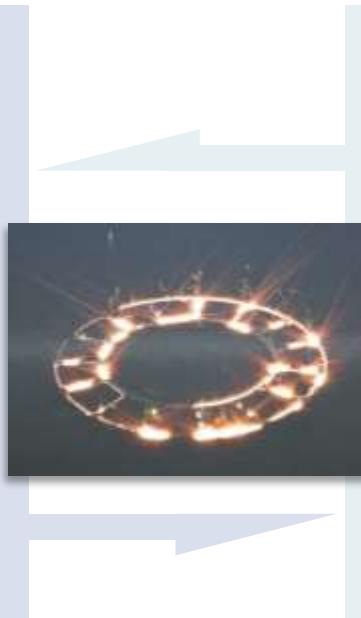
- Effect of heat treatment on micro-and nanostructure



- Fundamental understanding of deformation mechanism of CCA matrix and p-CCA



Our team



WP 1

WP 2

WP 3

Alloy
selection

screening

Atomization

processability

Additive
Manufacturing

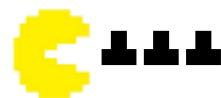
microstructure

post-heat
treatment

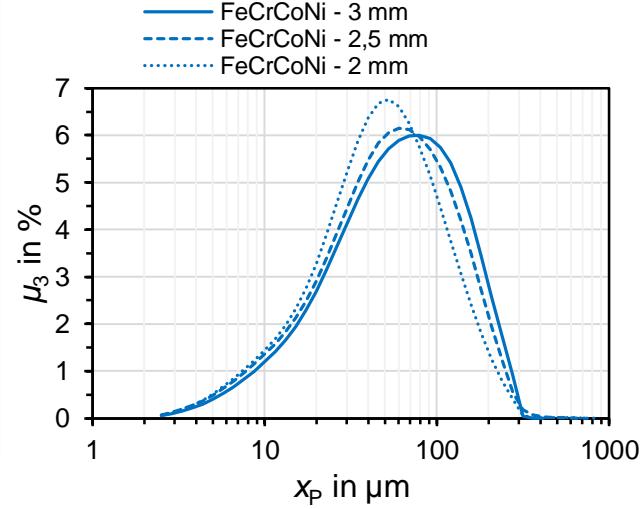
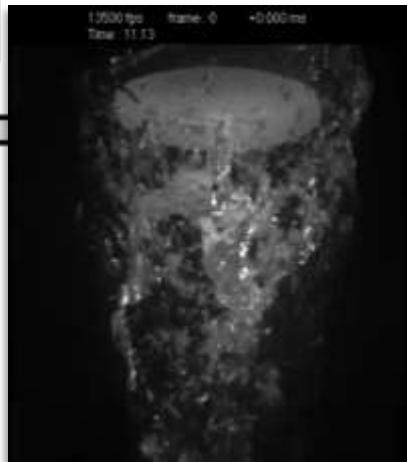
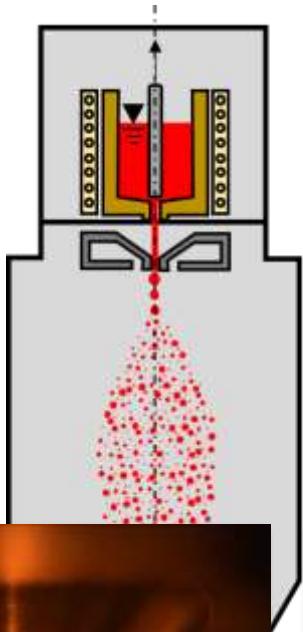
def. mechanism



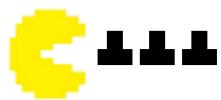
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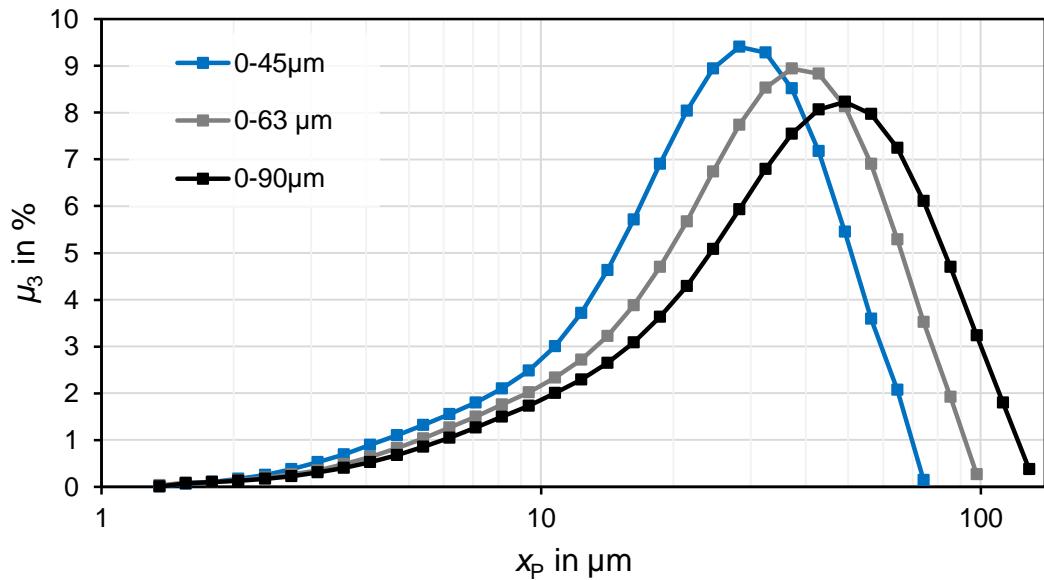
Melt atomization of p-CCA



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Powder processability



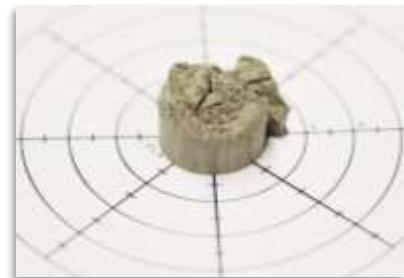
Sieved fractions of FeCrCoNi



0-45 μm



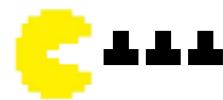
0-63 μm



0-90 μm

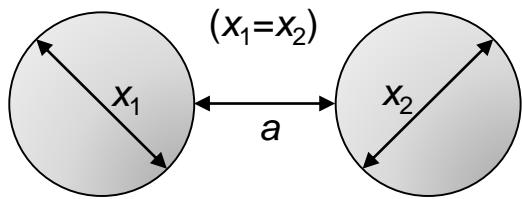


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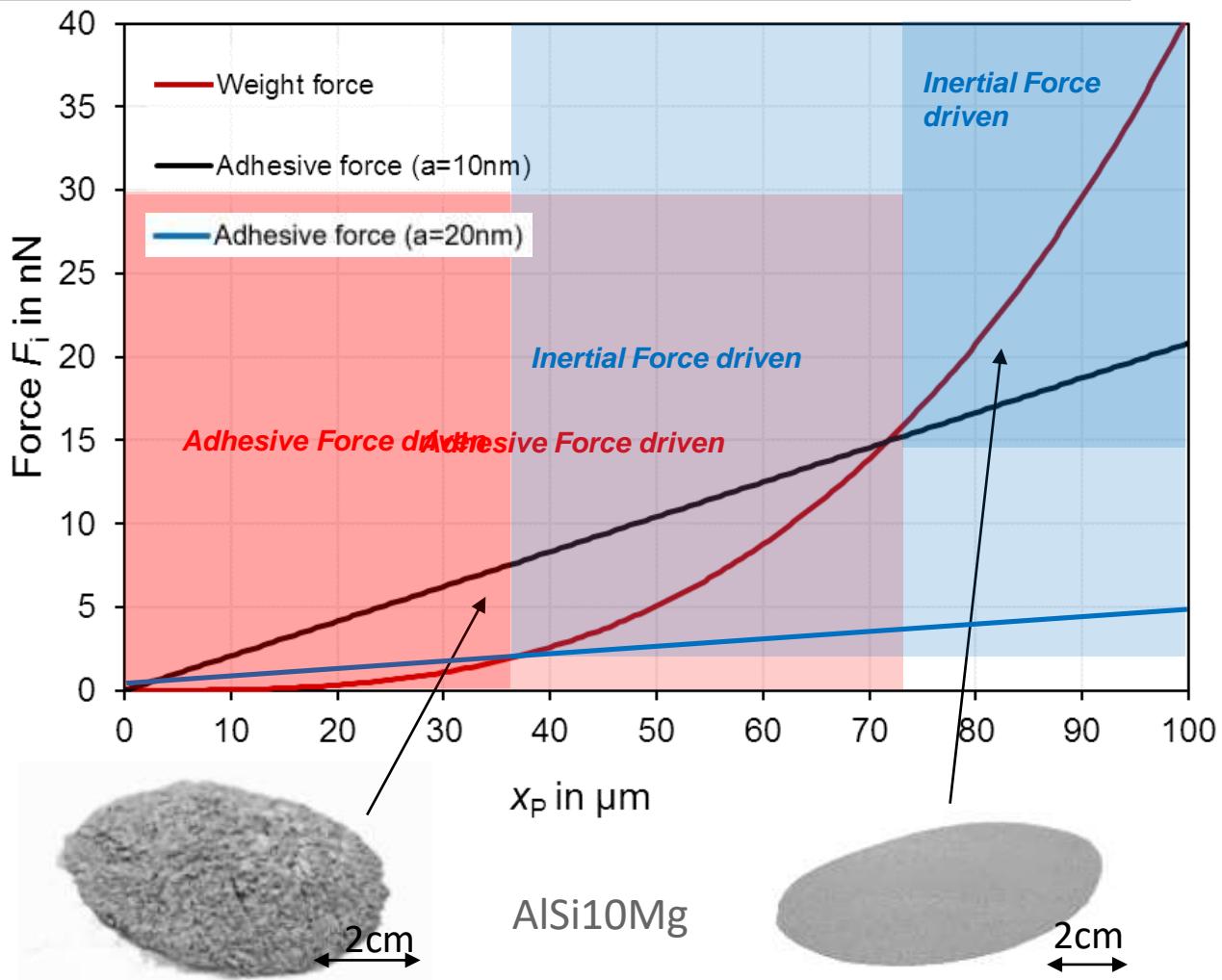


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Particle size control

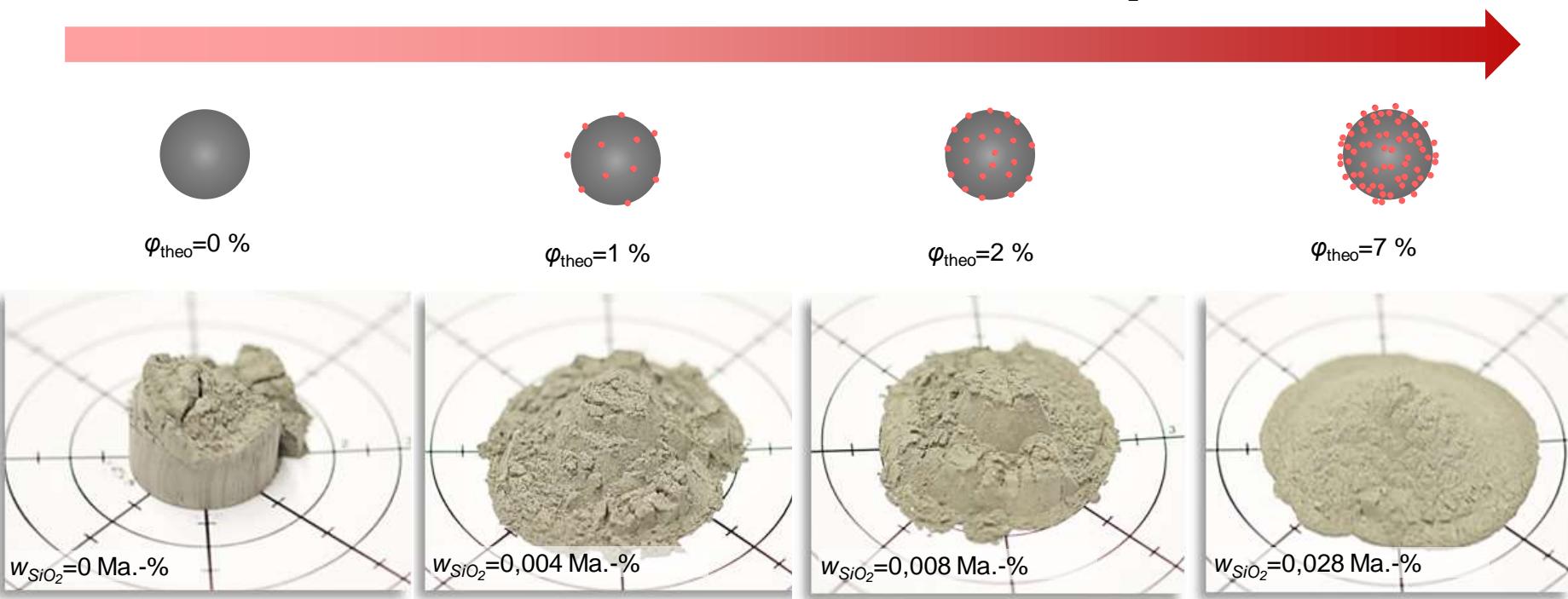


$$\frac{x_p}{a} = 1000$$

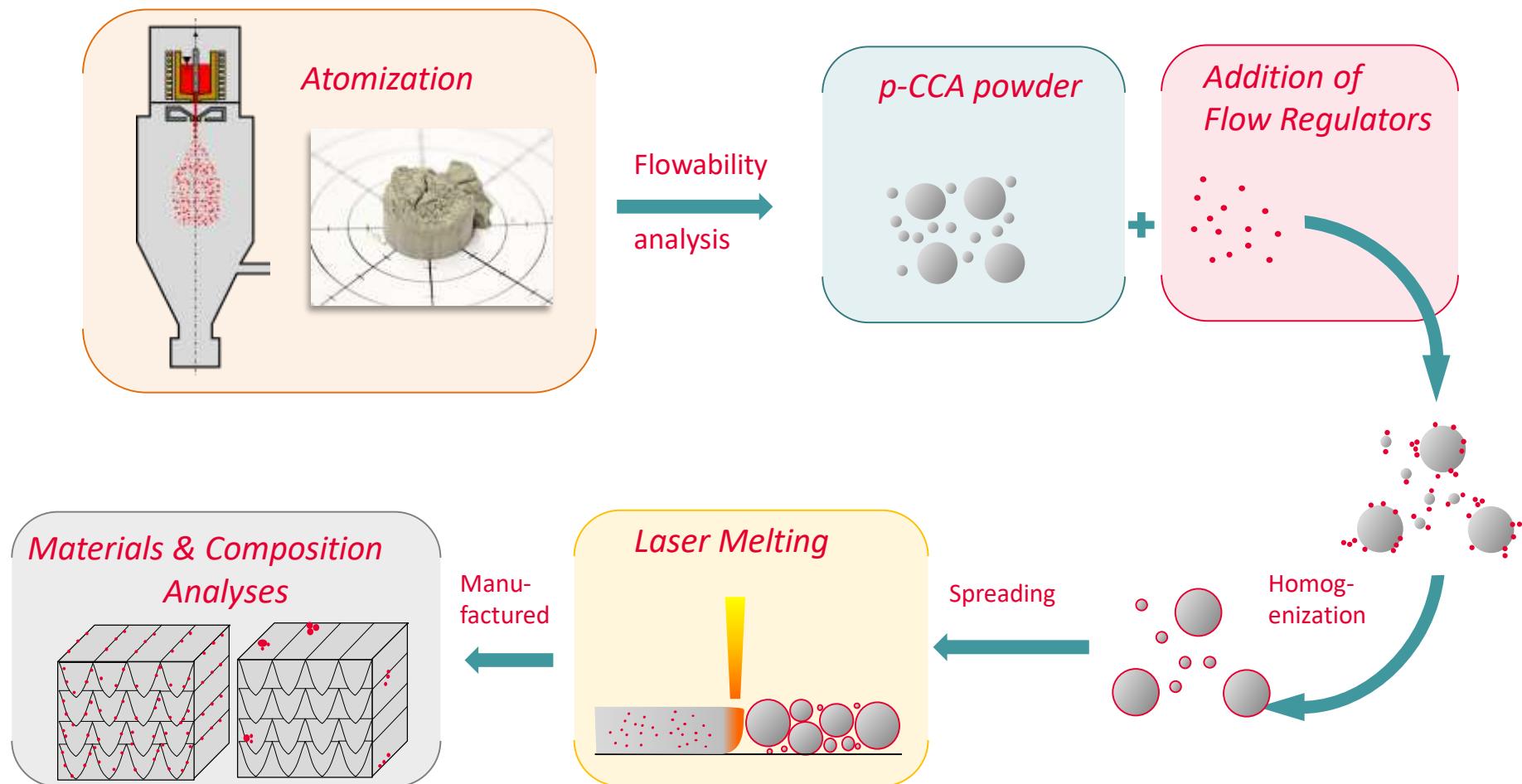


Improved flow via flow regulators (FeCrCoNi , $x_p < 90 \mu\text{m}$)

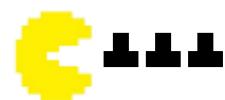
Increasing nano particle surface coverage (SiO_2 $x = 13,6 \text{ nm}$)



Material processing

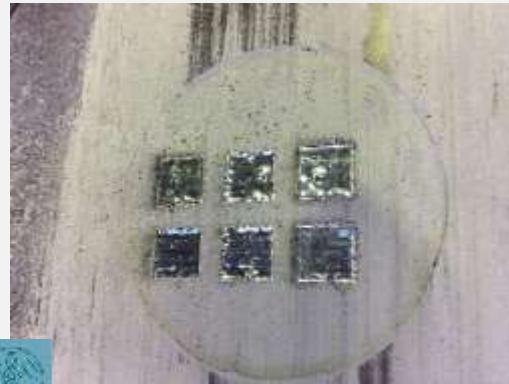


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Selective laser melting (SLM)

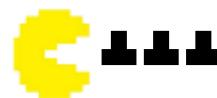
First manufactured parts and processing parameters



Analyses and heat treatment



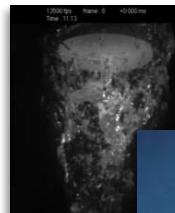
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What we do next?

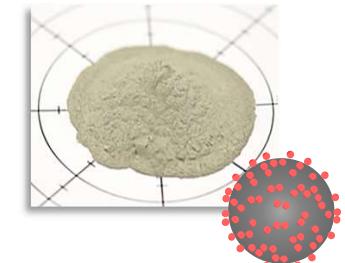
- Synthesis of particle-strengthened CCA synthesis by

- **Powder atomization**

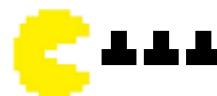


- **Additive manufacturing**

- High-quality CCA powder enhanced by nanosized flow regulators

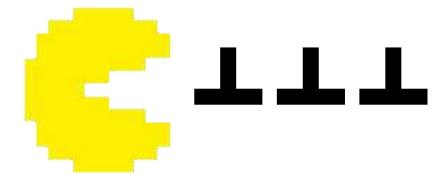


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DFG Deutsche
Forschungsgemeinschaft



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