

**Dr.-Ing. Sarah Fischer**  
**Forum Produktion 2023 – 9.-10. Mai 2023**

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# **Funktionsintegration durch additive Fertigung: Herausforderungen für die Qualitätssicherung und Instandhaltung**

**Mechanische Funktionsintegration  
durch additive Fertigung**

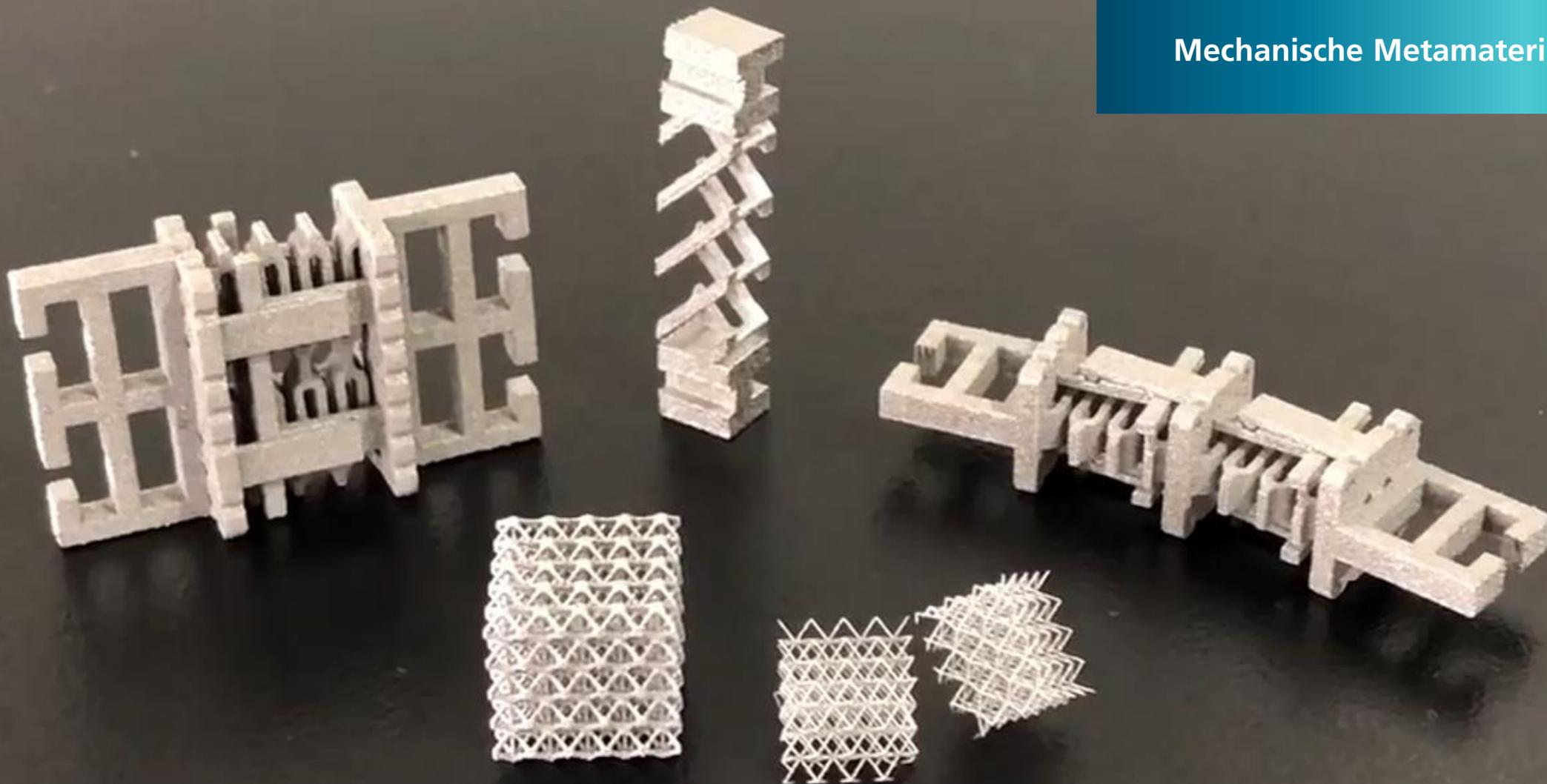
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Mechanische Funktionsintegration  
durch additive Fertigung



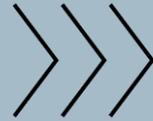
## Mechanische Metamaterialien



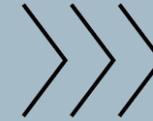
# Design und additive Fertigung von komplexen Materialsystemen



Material



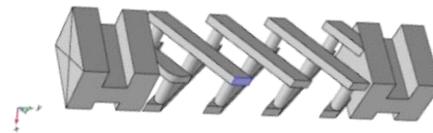
3D Modell



Bauteile

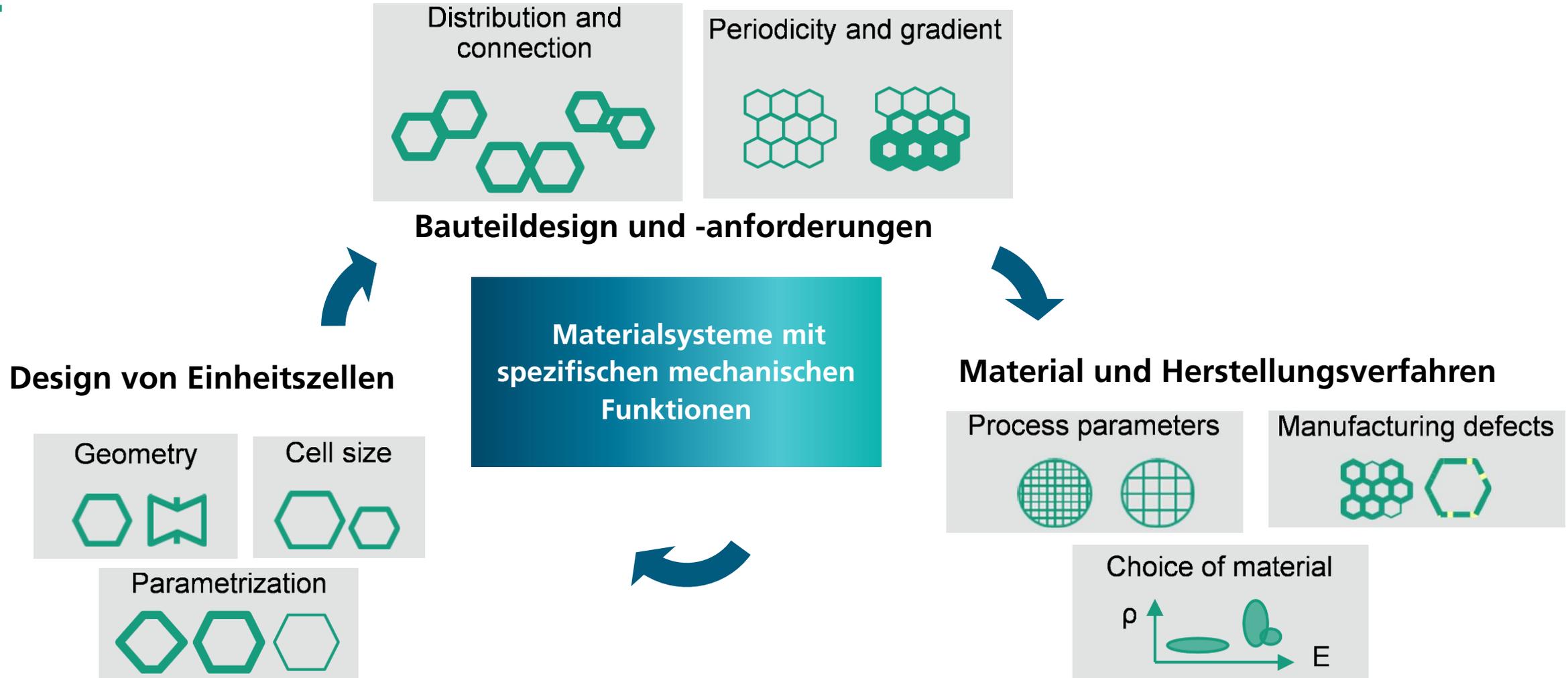
Metall

Ti-6Al-4V



# Additive Fertigung von mechanischen Metamaterialien

Mehr als nur Design und Simulation von Einheitszellen



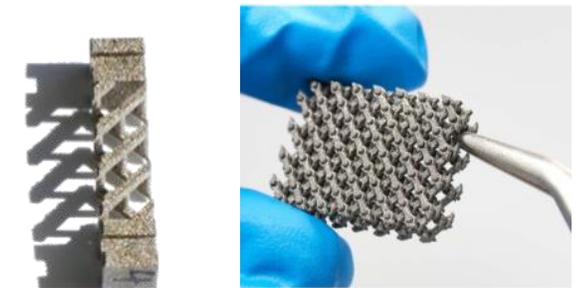
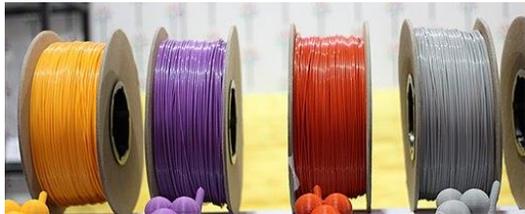
# Design und additive Fertigung von komplexen Materialsystemen



Material



Materialsystem



# Design und additive Fertigung von komplexen Materialsystemen



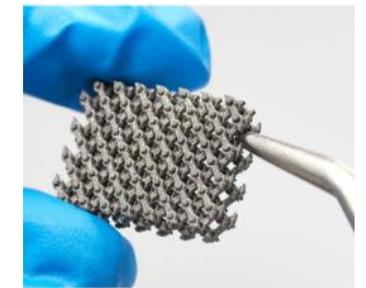
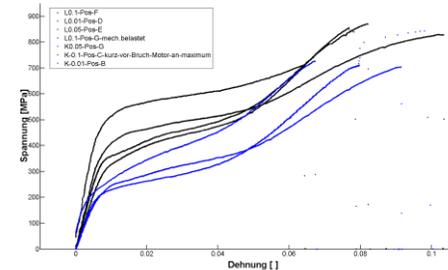
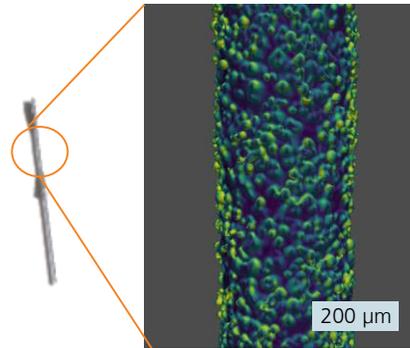
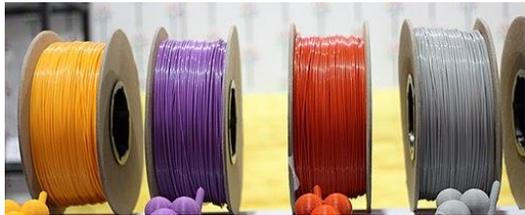
Material



Designelemente



Materialsystem



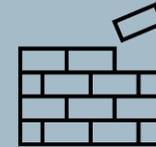
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Material



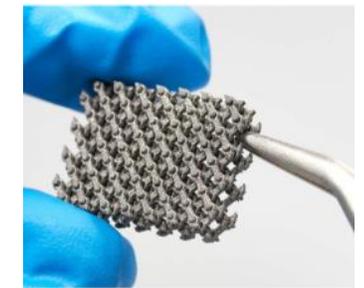
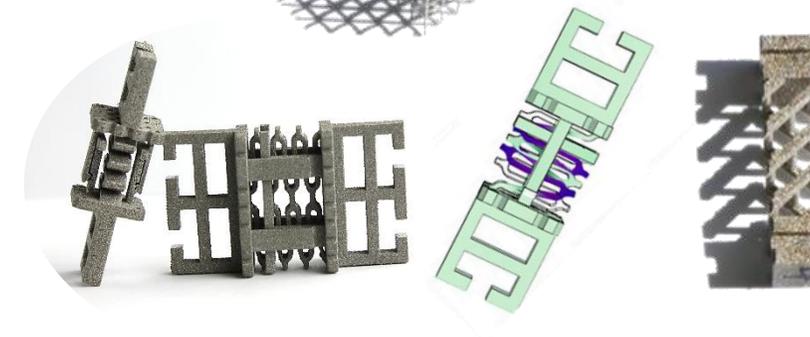
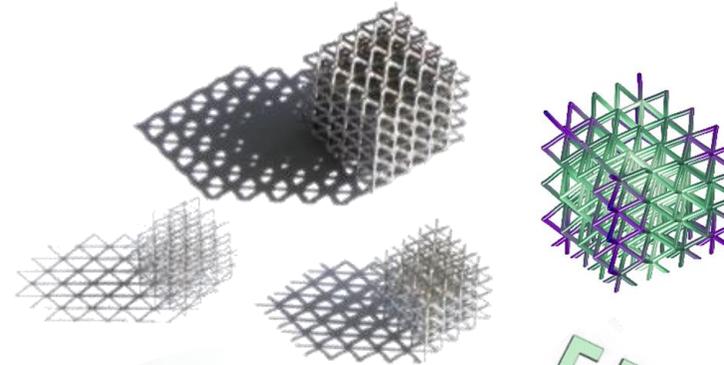
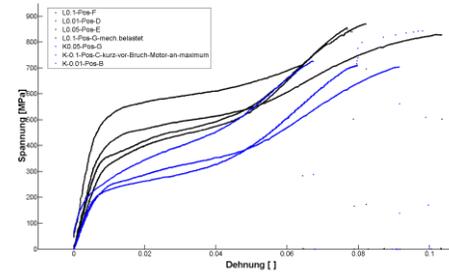
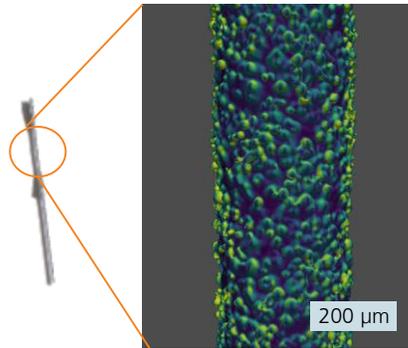
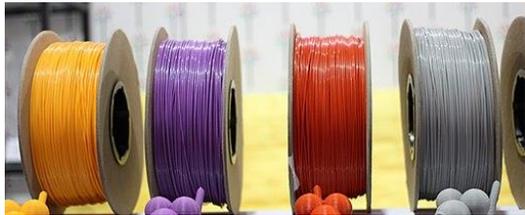
Designelemente



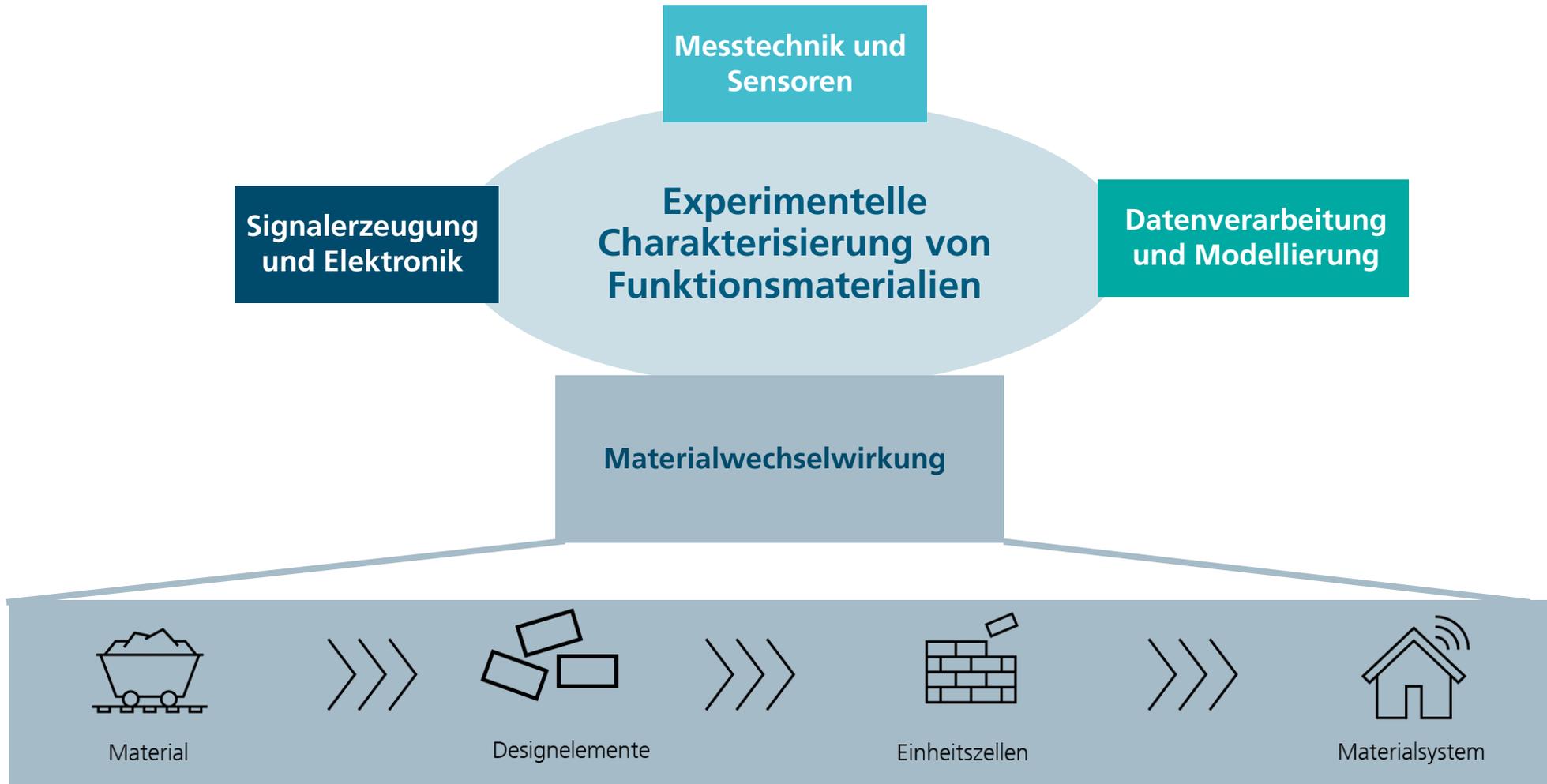
Einheitszellen



Materialsystem



# Qualitätssicherung für Additive Fertigung

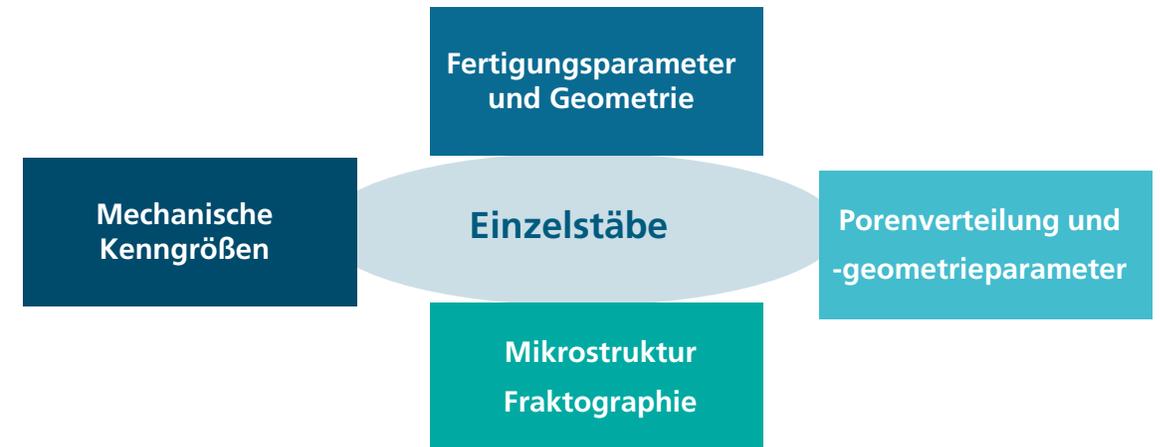
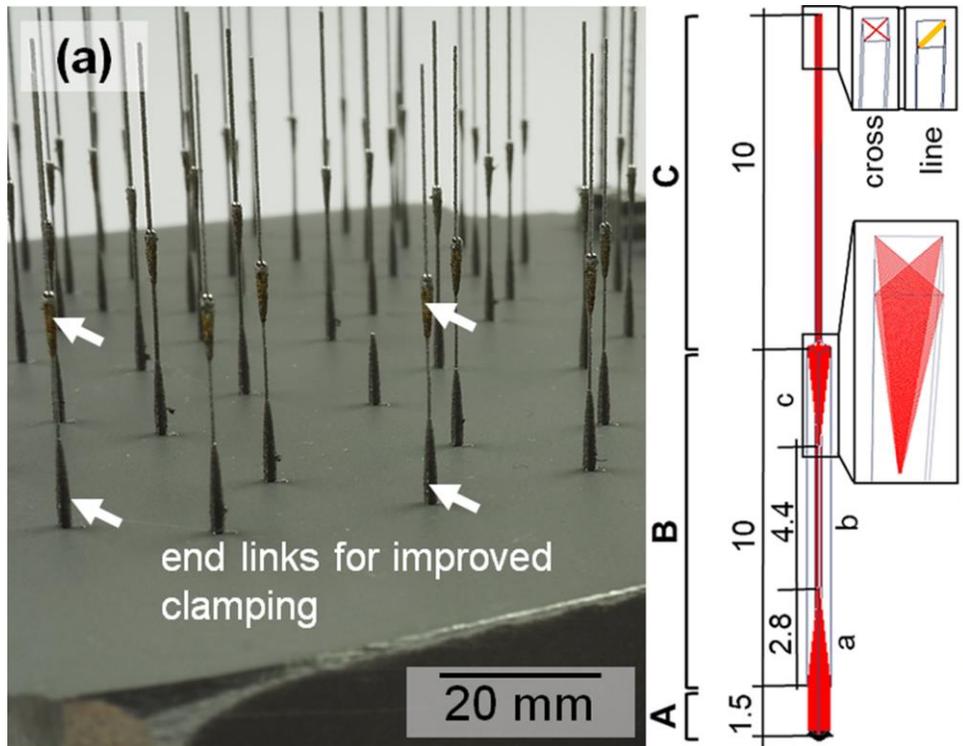


# Untersuchungen an Einzelstäben



Designelemente

NiTi struts Ni50.9Ti49.1 (at%) – diameter 180 – 350  $\mu\text{m}$

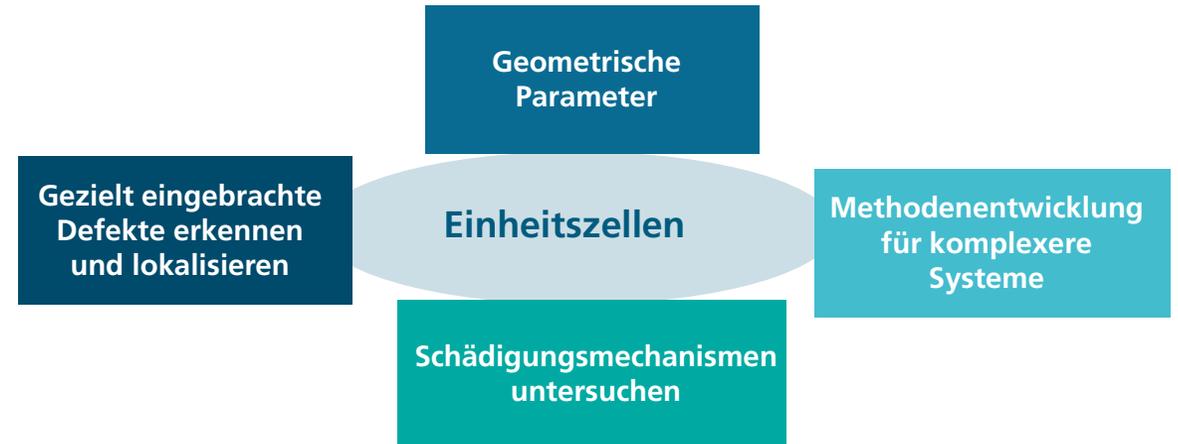
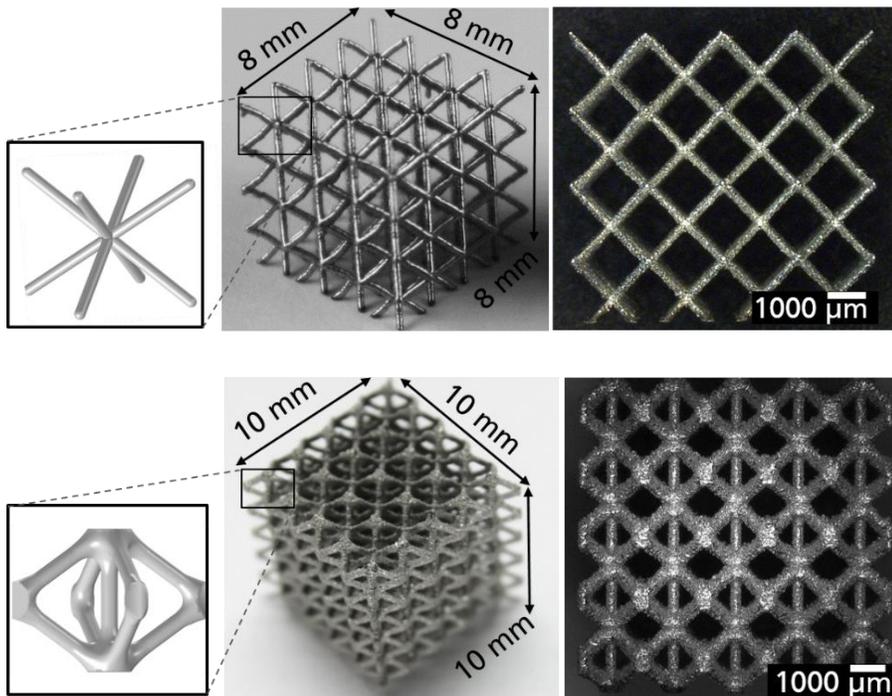


# Untersuchung von Modellstrukturen

Basis für die Methodenentwicklung an komplexeren Strukturen

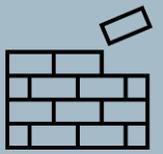


Einheitszellen

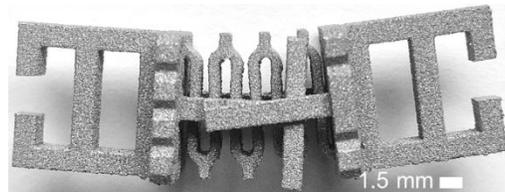
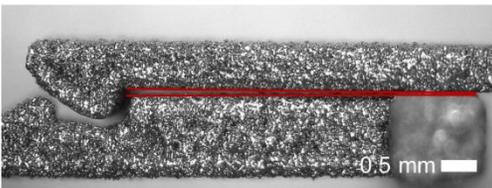
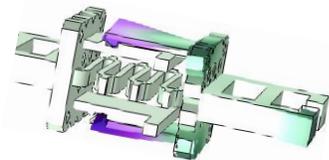
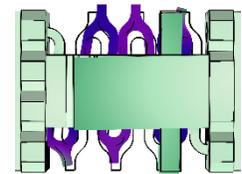
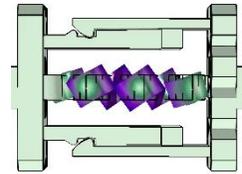
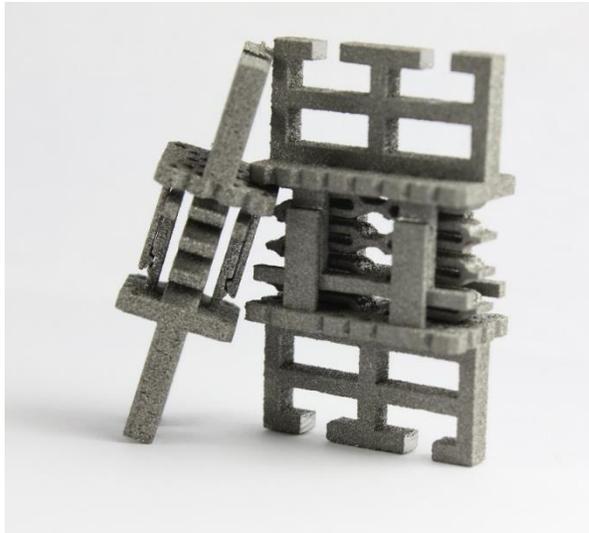


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Einheitszellen

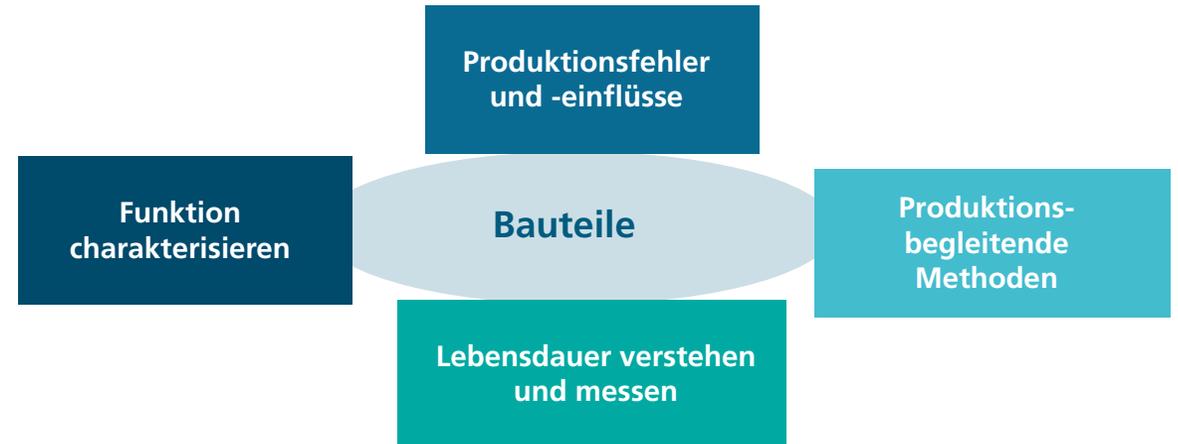
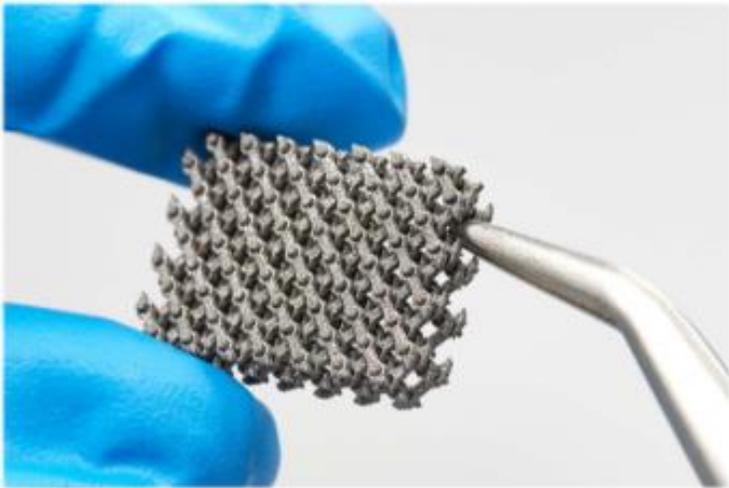
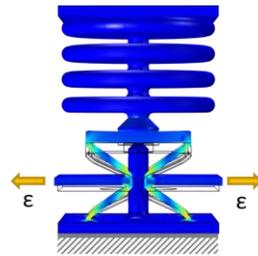


# Untersuchung von Bauteilen

Praxisnahe und anwendungsspezifische Methoden



Bauteile



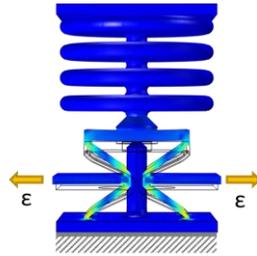
# Mechanische Funktionsmaterialien charakterisieren



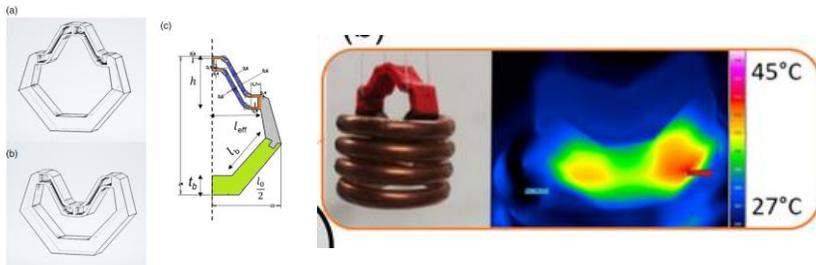
Bauteile

## Programmierbare Materialien

Fraunhofer Cluster ProgMat



Kaal, W.; et al. Programmable Materials 2023, 1, E1.  
doi:10.1017/pma.2022.1



Wenz, F. et al. Adv. Eng. Mat. 2022, 25(3), 2201022  
doi: 10.1002/adem.202201022

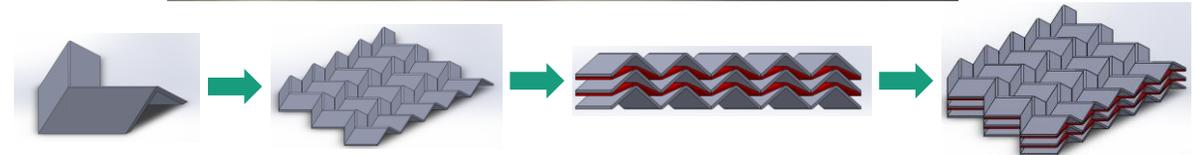
## Hybride Schäume

Kooperation Prof. A. Jung (HSU-HH)



Publications in preparation

## Miura-Ori Strukturen und akustische Metamaterialien



Schwarz, A. et al. Adv. Eng. Mater. 2022, 24, 2200386 doi: 10.1002/adem.202200386



Förderung:  **Fraunhofer**



Bundesministerium  
für Bildung  
und Forschung



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für Ernährung  
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CPM



# Vielen Dank für Ihre Aufmerksamkeit

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