Microheater Array Powder Sintering for Additive Manufacturing

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Background/Relevance

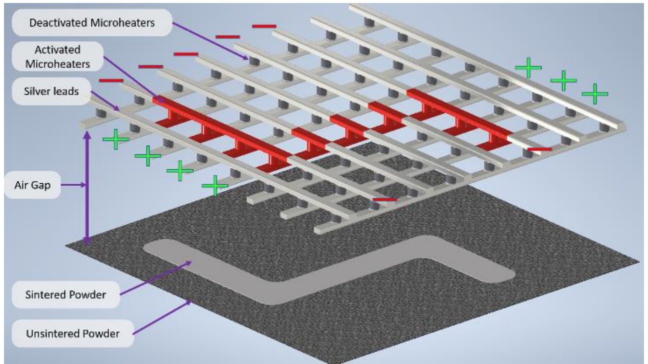
- SLS is slow, expensive, unreliable, and hard to scale.
- MAPS uses a microheater array as energy source to offer scalability, ~1000s of microheaters VS single point laser
- MAPS print heads are cheap to produce, thick film processing, disposable
- Order of magnitude less power consumption.
- Microheaters offer closed loop control through self sensing of temperature.

Innovation

- Develop a new method of fabricating a large microheater array.

Key Results

- Designing and manufacturing large area microheater array
- Developing improved printer control and scanning calorimetry
- Moving toward commercialization with NSF I-Corps



Approach

- Build reliable large scale microheater array
- Characterize TCR and I/V characteristics in air, helium, and cold plasma
- Model heat transfer across various media into nanoparticle materials, characterize real world behavior and validate model.
- Prototype MAPS printer with improved print head and apply validated model to predict performance and create new standards for AM.

Conclusions

- Plan to overcome the requirement of a small air gap problem by scaling heater array and improving repeatability.
- Plan to improve microheater lifetime without increasing cost through thick film processing
- Plan to demonstrate commercial viability through MVP development and demonstration of industrially useful prints.

Future Work

- Develop scanning calorimetry standards for various materials
- Build HTCC heater arrays and push reliable operating temperature to 1600-2000 °C

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