The Impact of Post Processing Heat Treatments on Elemental Distribution and Corrosion Properties of Cold Spray 3D Printed Al Alloys.

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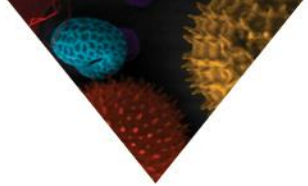

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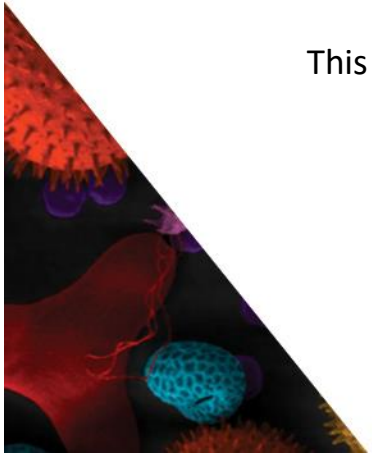
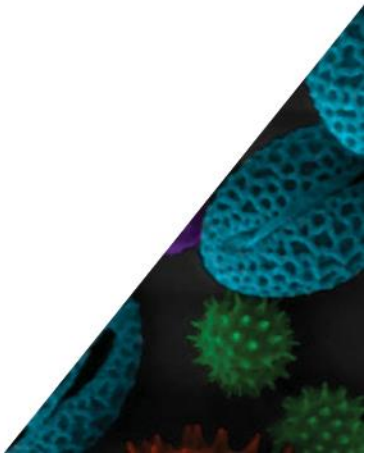
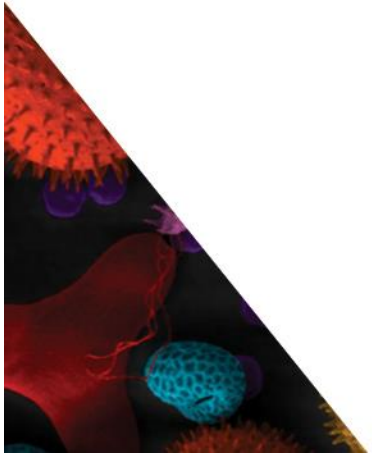
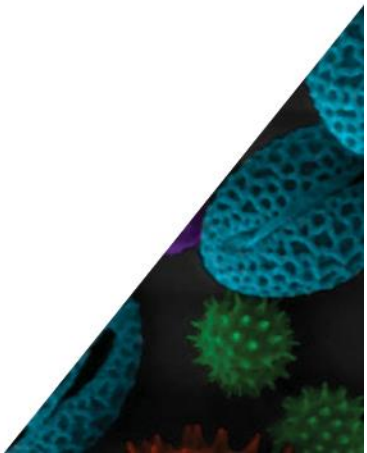








Professor Jamie Quinton

Dr Rebecca Murray

Dr Rebecca Adamson

SPEE3D Cold Spray

LightSPEE3D printer

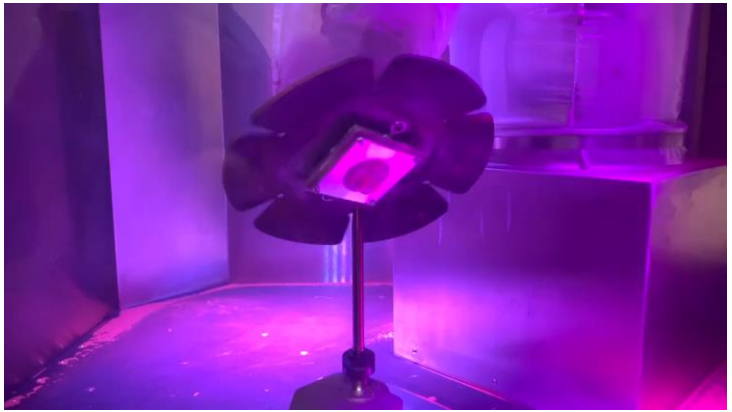
Benefits over traditional manufacturing and AM methods

- Low printing temperatures
- Accelerated deposition rate
- Air carrier gas

Due to low printing temperatures, post processing is required

The impact of post processing treatments is currently being investigated

SPEE3D Cold Spray



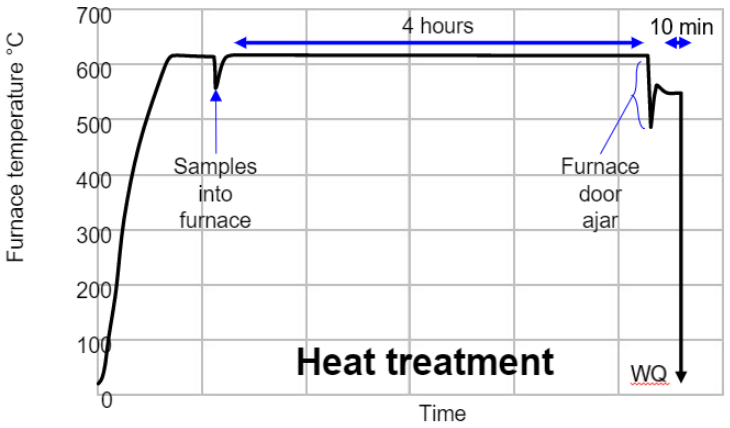
LightSPEE3D printer

Benefits over traditional manufacturing and AM methods

- Low printing temperatures
- Accelerated deposition rate
- Air carrier gas

The impact of post processing heat treatment parameters on the microstructure and distribution of Mg and Si trace elements within an Al alloy was investigated

Printing and Post Printing Parameters



Samples printed using LightSPEE3D printer at 30 Bar, 500°C

Sample reference	Powder and post processing heat treatments
No Heat Treatment	Ecka aluminium 6061 - no HT
615°C$_{extended}$	Ecka aluminium 6061 - 615°C x 420min, 550°C x 30min, WQ, 160°C x 120min
615°C	Ecka aluminium 6061 - 615°C x 240min, 550°C x 10min, WQ, 225°C x 270min
615°C$_{charcoal}$	Ecka aluminium 6061 - 615°C x 240min in vessel with charcoal, 550°C x 10min, WQ, 225°C x270min

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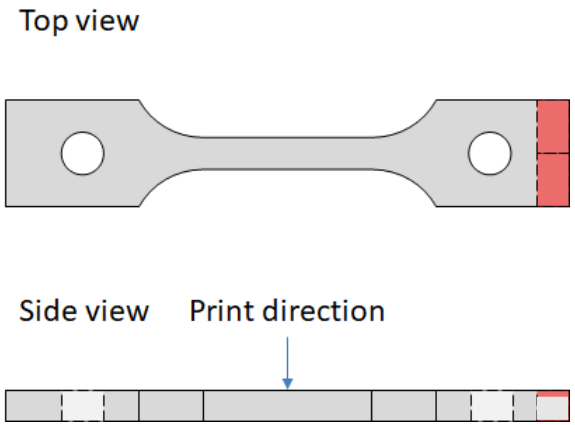
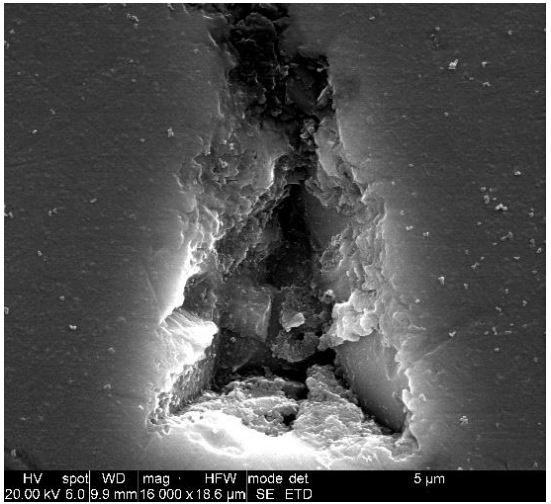
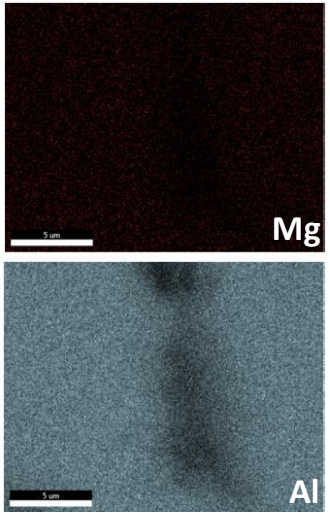


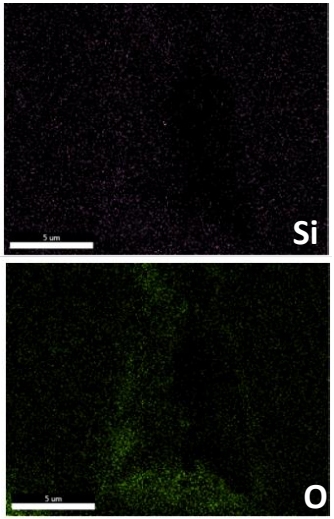
Morphology of the Microstructure

No Heat Treatment

Mg, Si, Al and O elemental maps (right) shown for the corresponding SEM image (left).



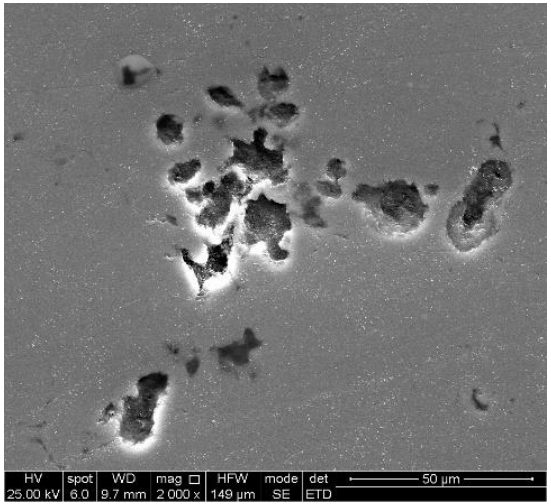


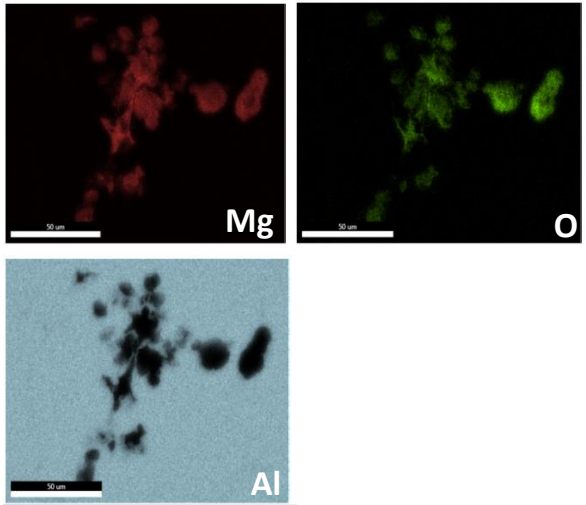


Morphology of the Microstructure

615°C$_{extended}$ Sample - 615°C x 420min, 550°C x 30min, WQ, 160°C x 120min

Mg, O and Al elemental maps (right) shown for the corresponding SEM image (left).





Morphology of the Microstructure

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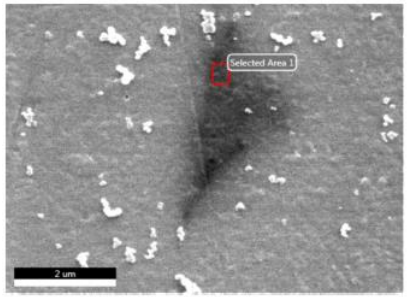
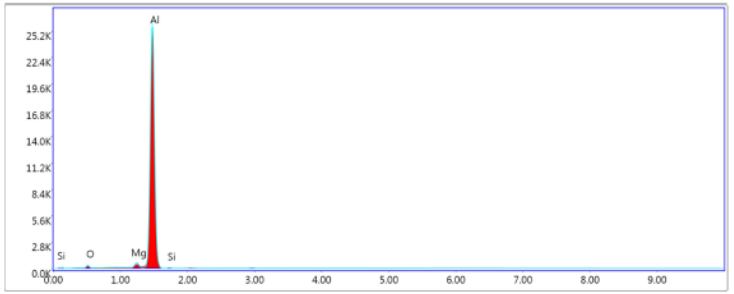
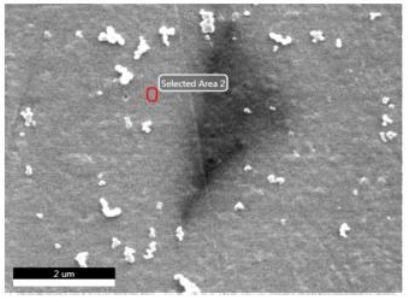
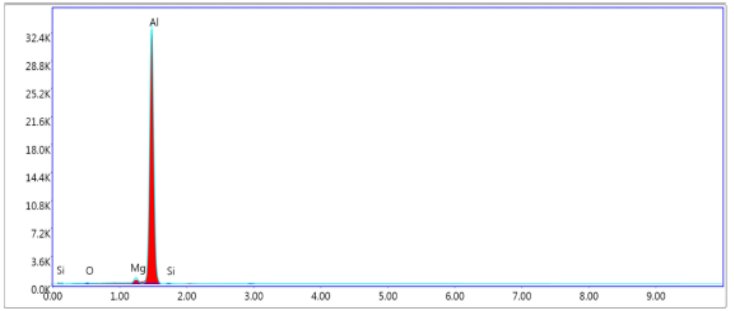
EDS spectra (right) shown for the corresponding SEM images (left).









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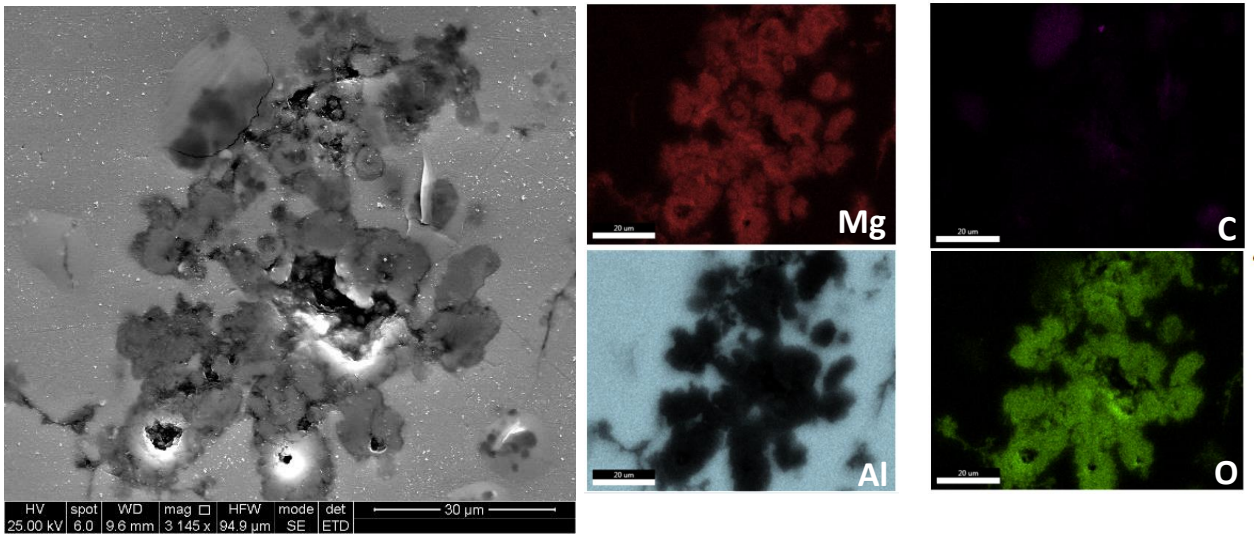
615°C sample - 615°C x 240min, 550°C x 10min, WQ, 225°C x 270min

Mg, C, Al and O elemental maps (right) shown for the corresponding SEM image (left).



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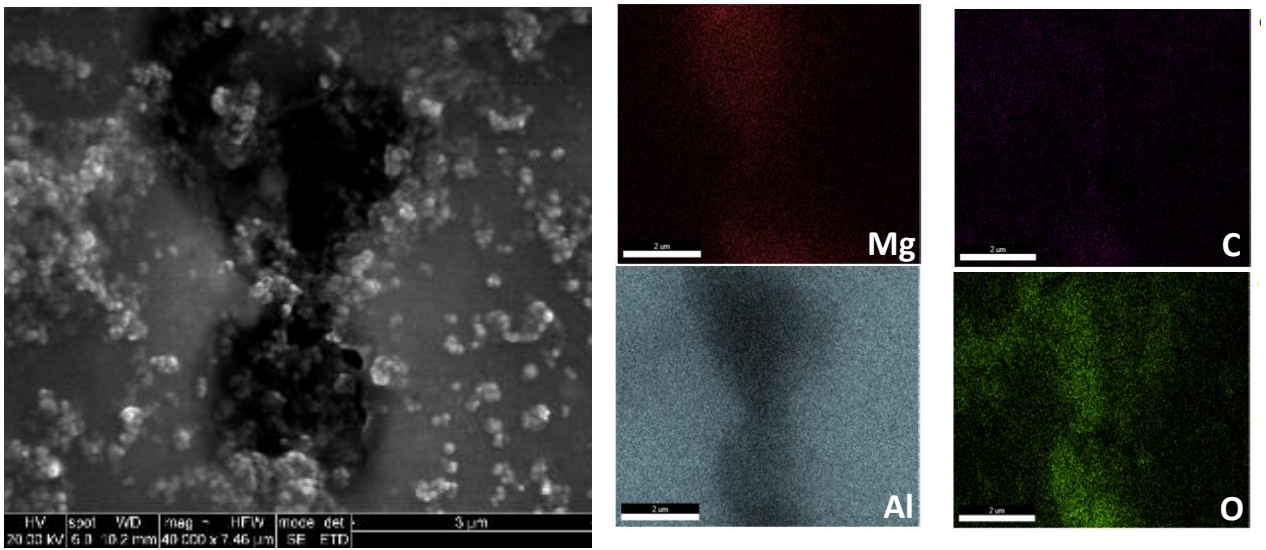

Morphology of the Microstructure

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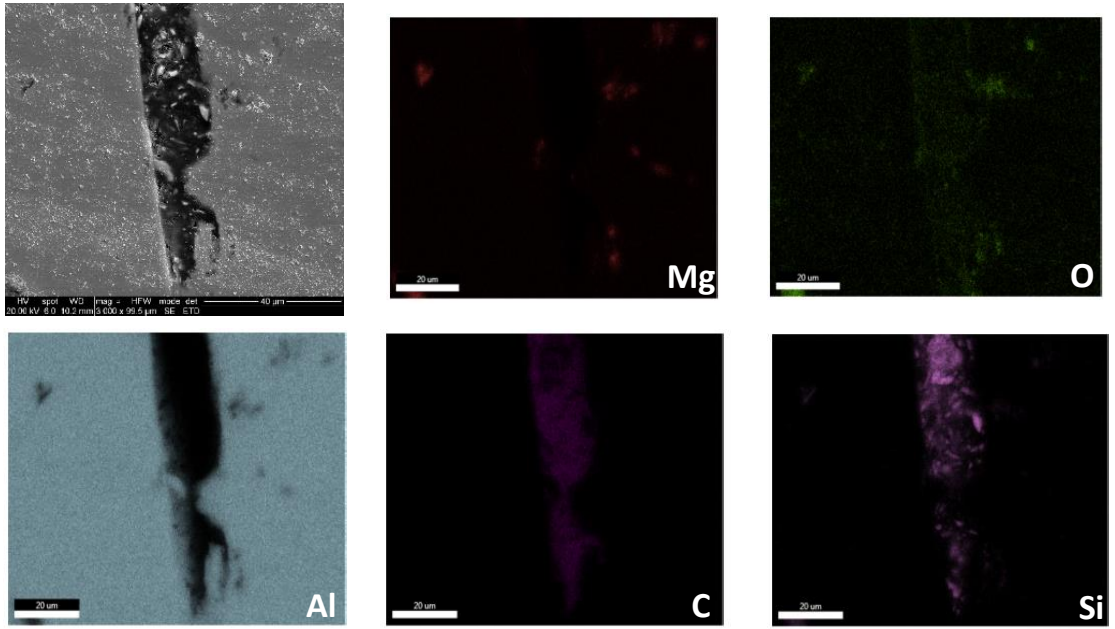

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