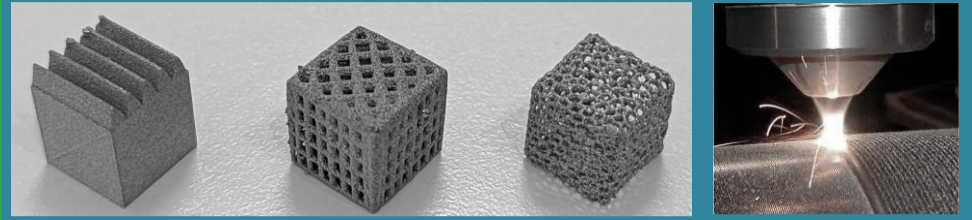


Introduction

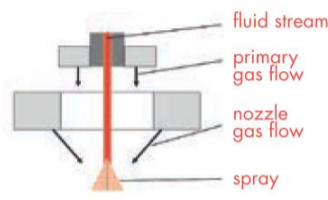
The GREENMat research unit, part of the University of Liège, has focus activity over the last 5 years on the **production and characterization of metal and alloy powders fabricated from pure or recycled alloy scrap**. The spherical metal powders produced by gas atomization are tailored such as fit processes like additive manufacturing, thermal spray or laser cladding for the protection, repairing or the fabrication of new metal parts.



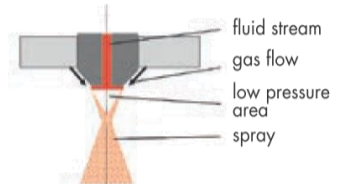
Description of the gas atomisation installation



Free fall nozzle



Close coupled nozzle



Particle Size Distribution: between ~1 and ~250µm.

Particle size tuning via the gas pressure, melt temperature, and flow rate adjusting

Controlled atmosphere during melting and atomization (vacuum or inert gas – N₂), O₂ < 0.5 ppm

Surface passivation function → metal powders surface inertization

Melting Capacity: 1.5 liters, approx. 3 kg of aluminum, 7 kg of copper, or 8 kg of steel per cycle.

Maximum Temperature: up to 2'000 °C, suitable for high-melting alloys such as platinum or chromium.

Materials: Ag, Au, Fe, Zn, Sn, Al, Pt, 17-4PH, steel, SS

Metal powder sorting



Throughput (steel) 72 kg / h
Classifier range 4 - 120 µm
Precision ± 2 µm
Number of cut points Single stage
Process atmosphere Inert gas

Metal powder characterization



Flowability



Cohesivness



Tap density

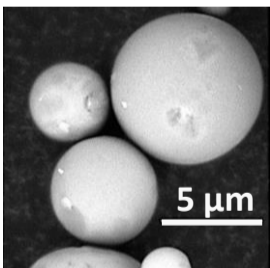


Microscopy techniques

Brief review of materials tested so far

AlSi₁₀Mg powder fabricated from metal scrap

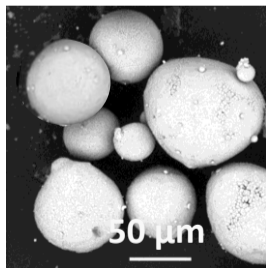
Close coupled (CCA)



950°C

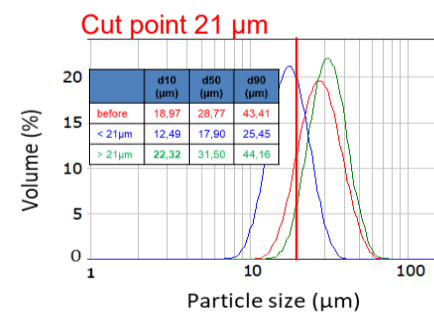


Free fall (FFA)

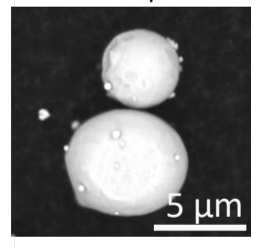


CuSn₁₀ powder fabricated from pure alloy pellets

CuSn10 – CCA

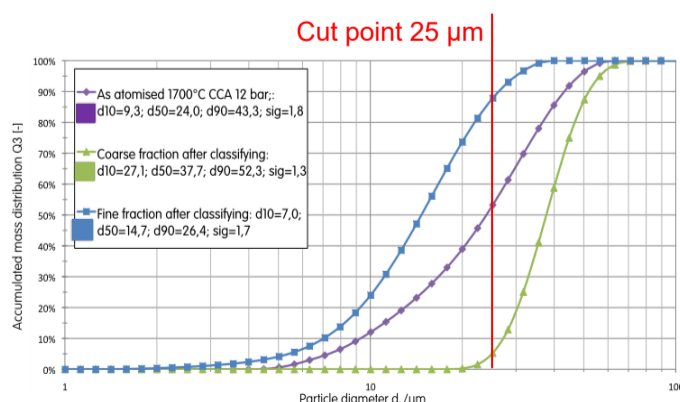
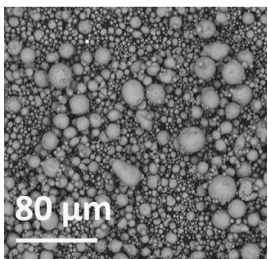


< 20 µm

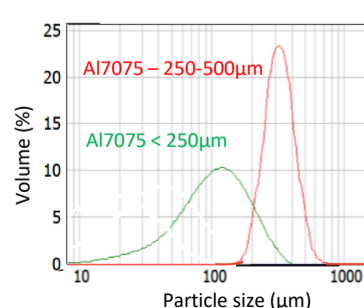


316L steel

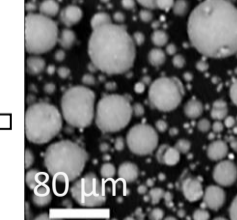
before sieving



FFA after sieving

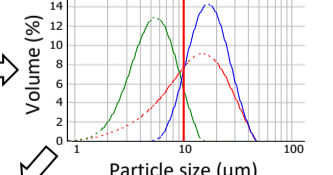


Al7075



CCA after sieving,

Cut point 10 µm



	d10 (µm)	d50 (µm)	d90 (µm)
before	4,5	12,8	27,1
< 10µm	2,8	5,3	9,2
> 10µm	10,0	17,0	28,6

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