

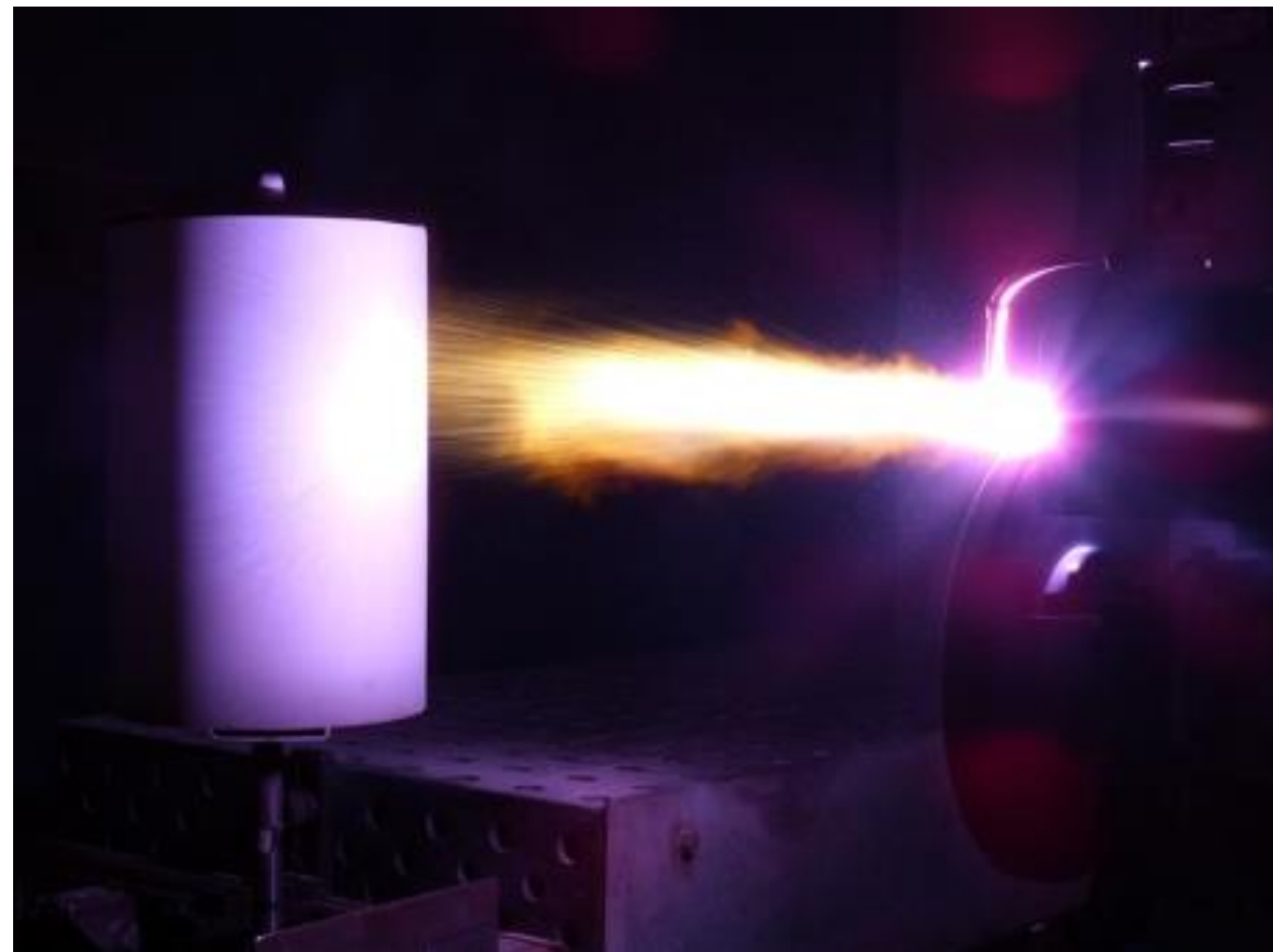


PLASMA SPRAYING AND COLD SPRAY FOR AEROSPACE

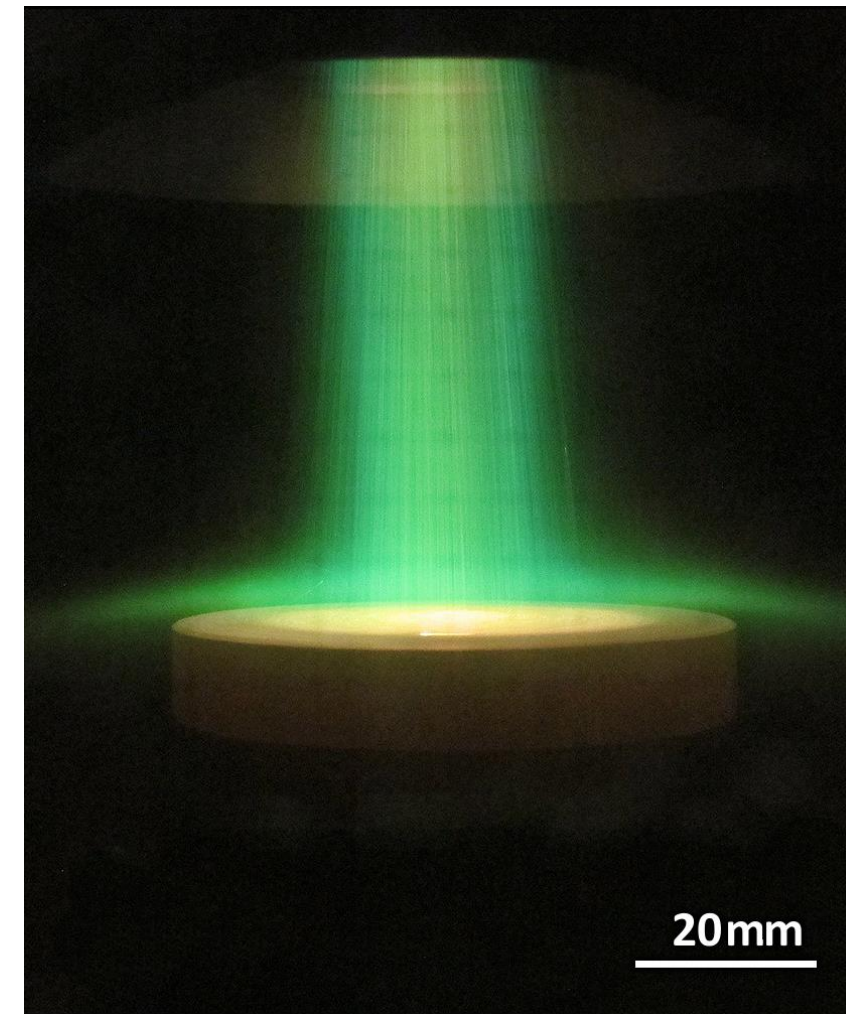
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Plasma spraying WSP-H



Plasma spraying RF-ICP



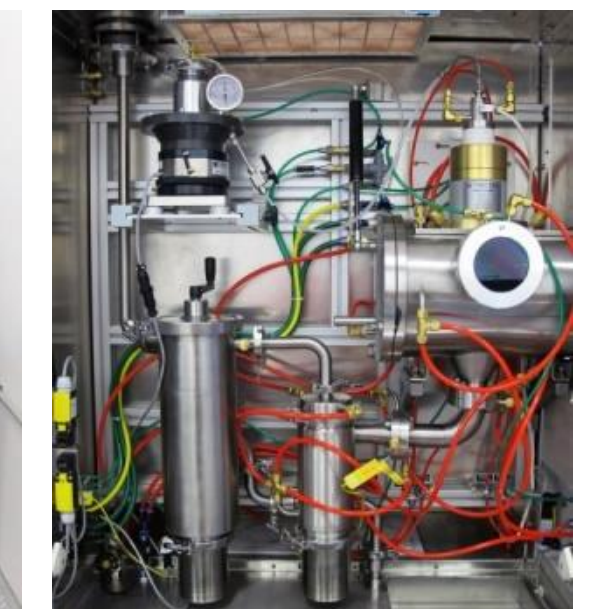
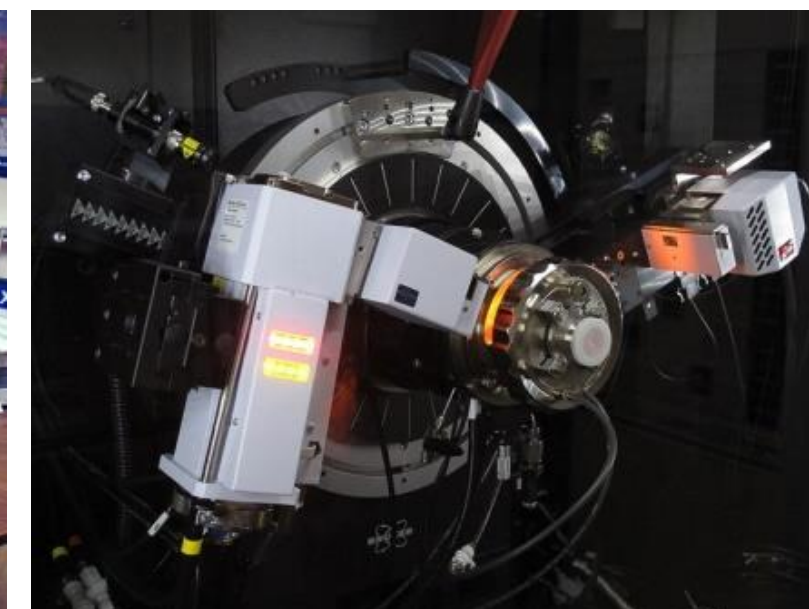
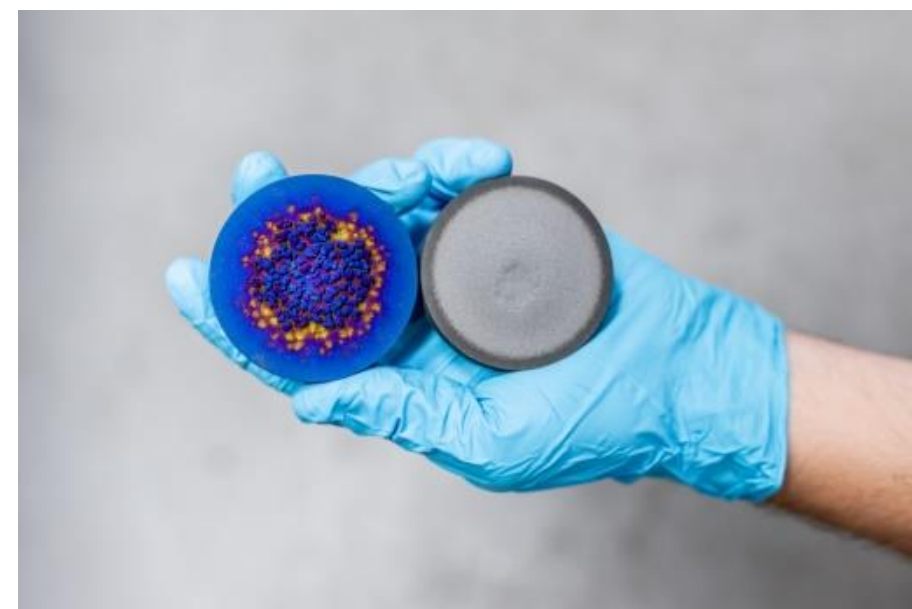
Spark plasma sintering



Cold spraying CGT 8000-X

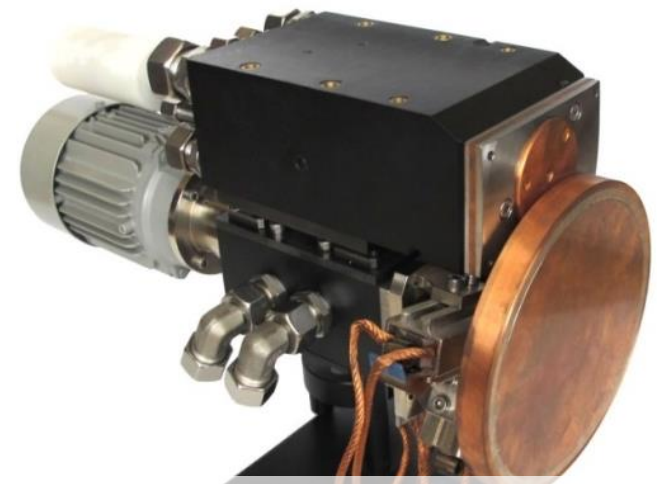


Analytics



Plasma spraying: WSP-H

- Fast deposition of thick protective and functional coatings (few μm to several mm)
- Ceramic, metallic and composite coatings (thermal barrier coatings, insulators)
- Powder spheroidization and homogenization by remelting



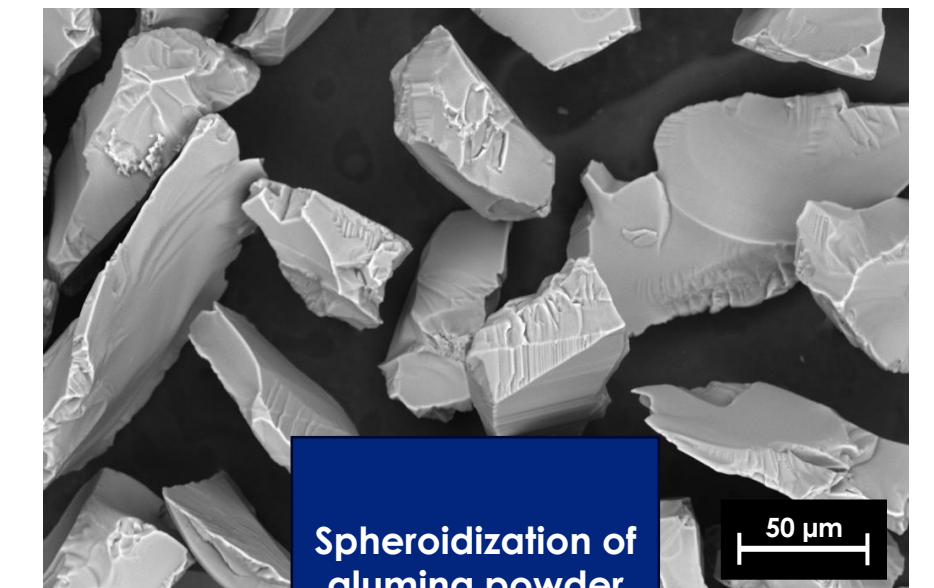
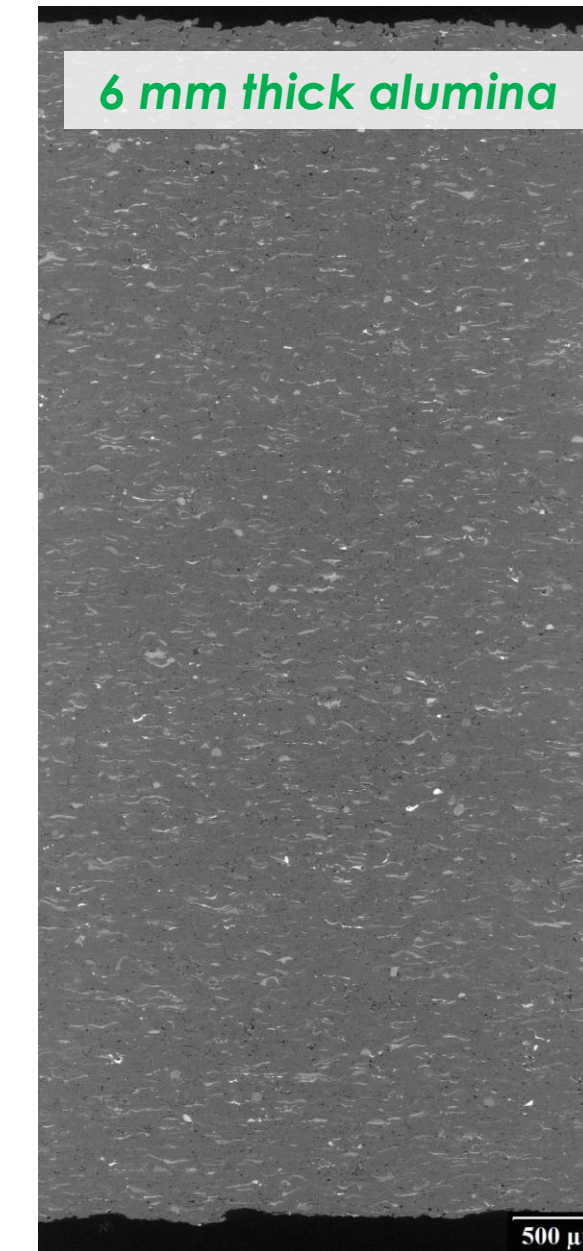
WSP[®]-H 500 plasma torch

I. Dry coarse powders $D_{50} \sim 15 - 100 \mu\text{m}$

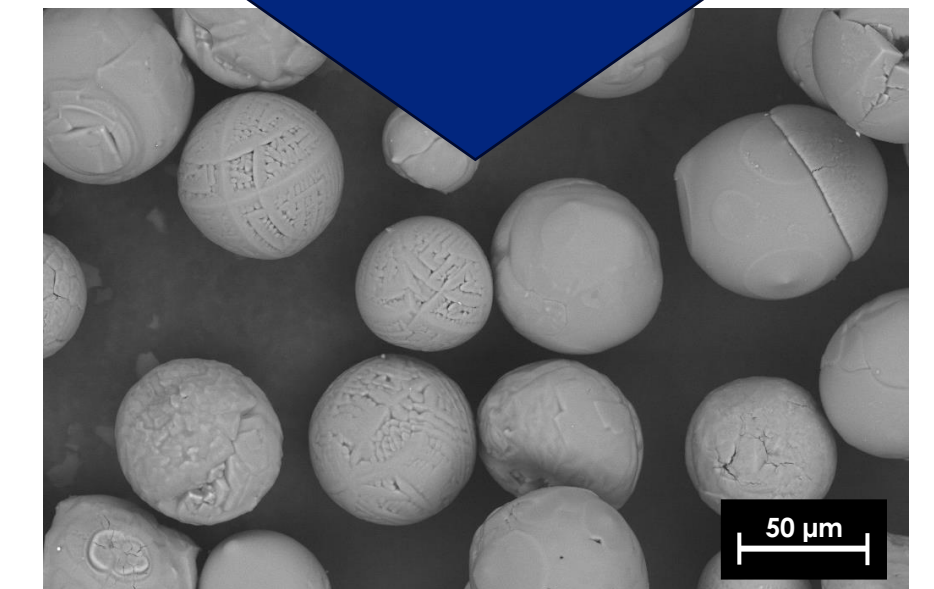
- high deposition rate \rightarrow thick coatings

II. Liquids - Suspensions $D_{50} \sim 50 \text{ nm} - 5 \mu\text{m}$ - Solutions - dissolved precursors

- Smaller splats \rightarrow different build-up mechanisms \rightarrow new microstructures

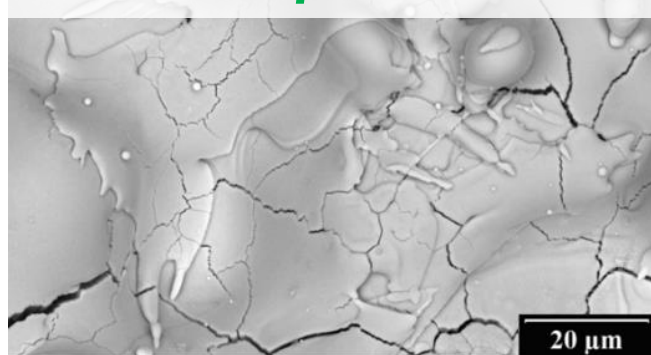


Spheroidization of alumina powder by WSP-H plasma

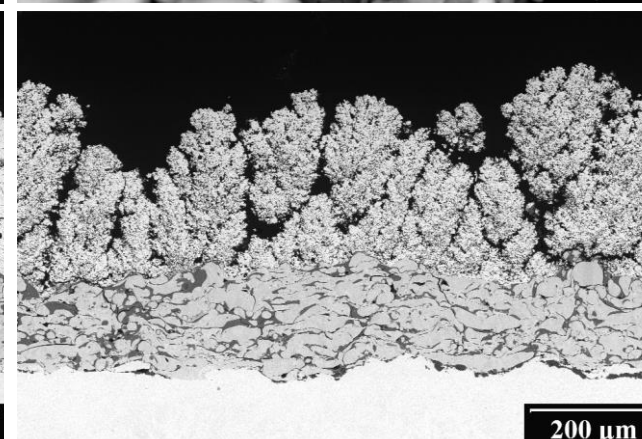
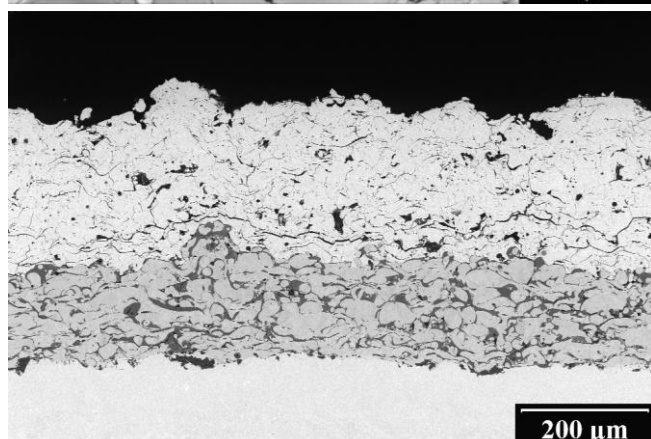
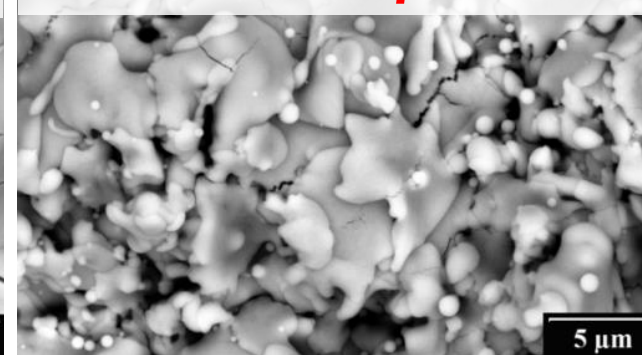


Microstructure control

YSZ from powder

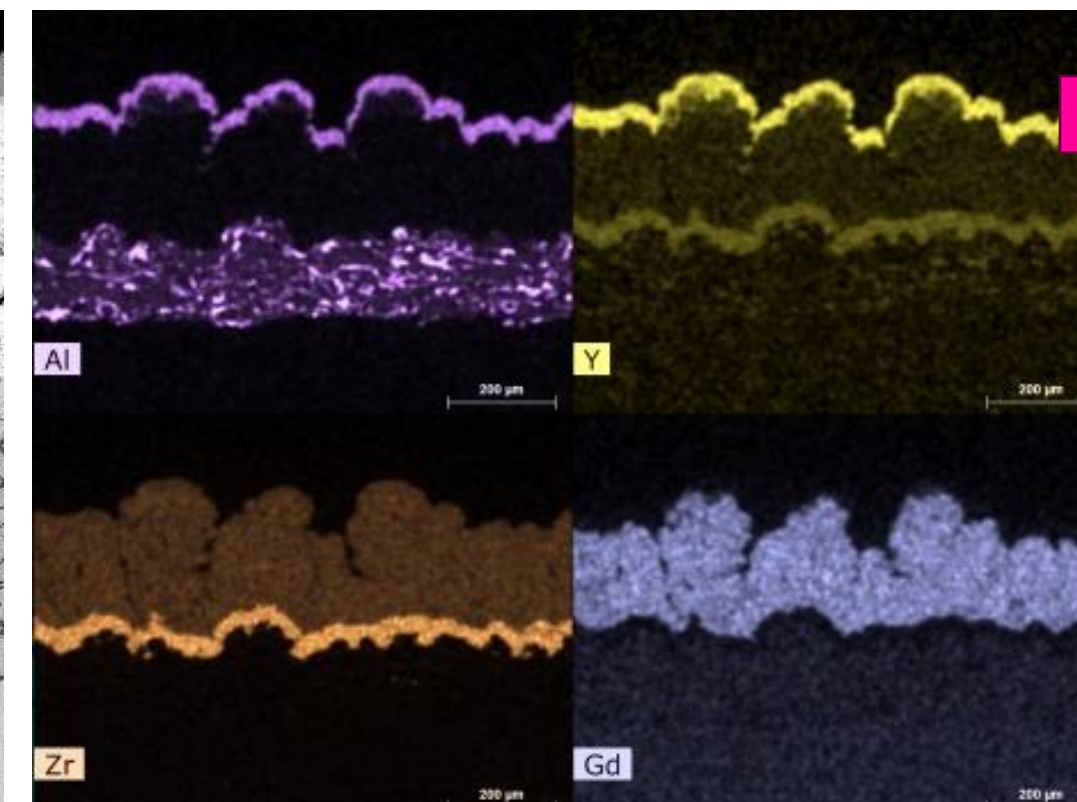
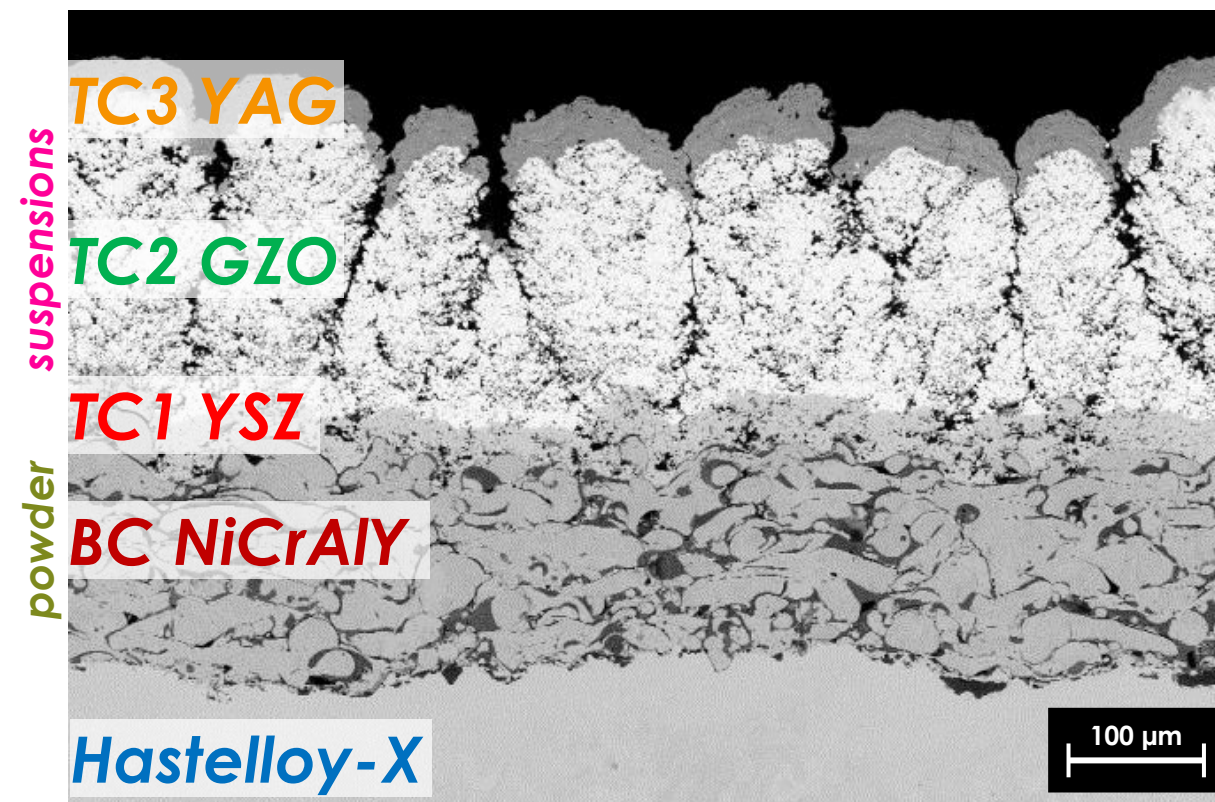


YSZ from suspension

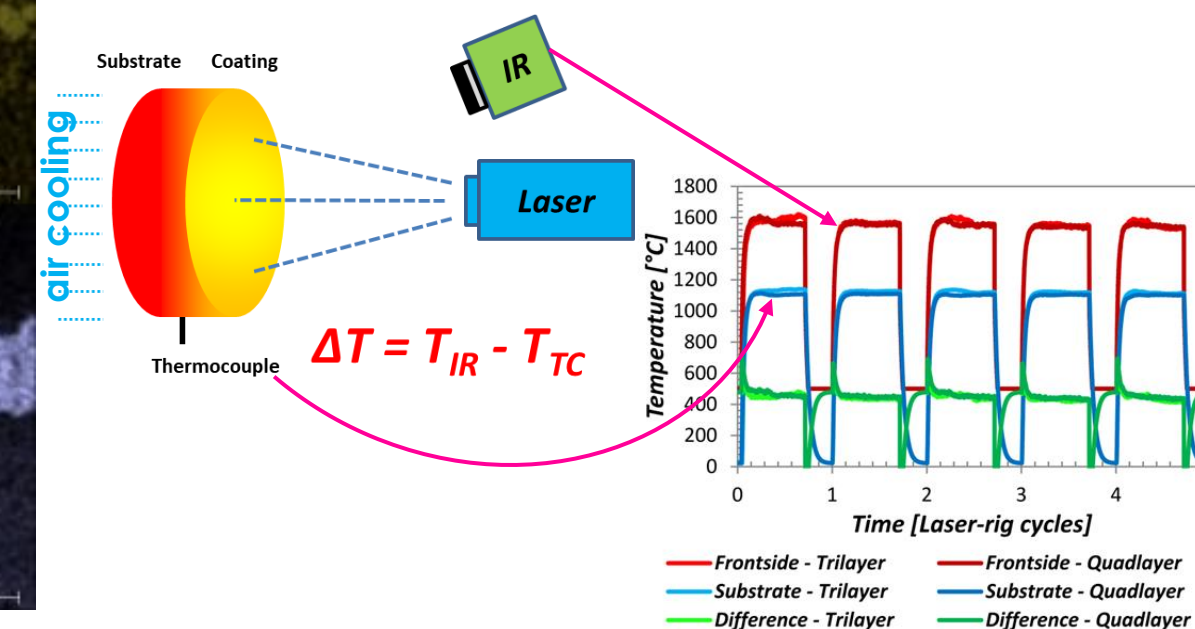


YSZ
BC

Multilayer coatings



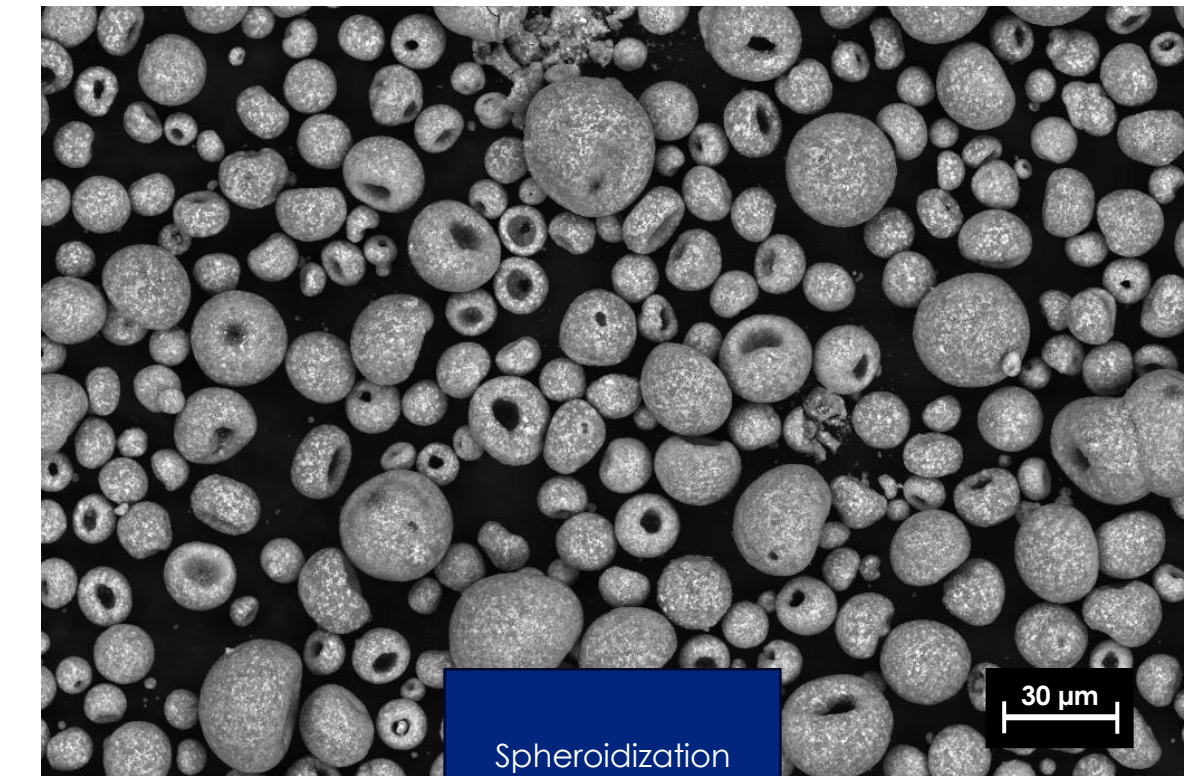
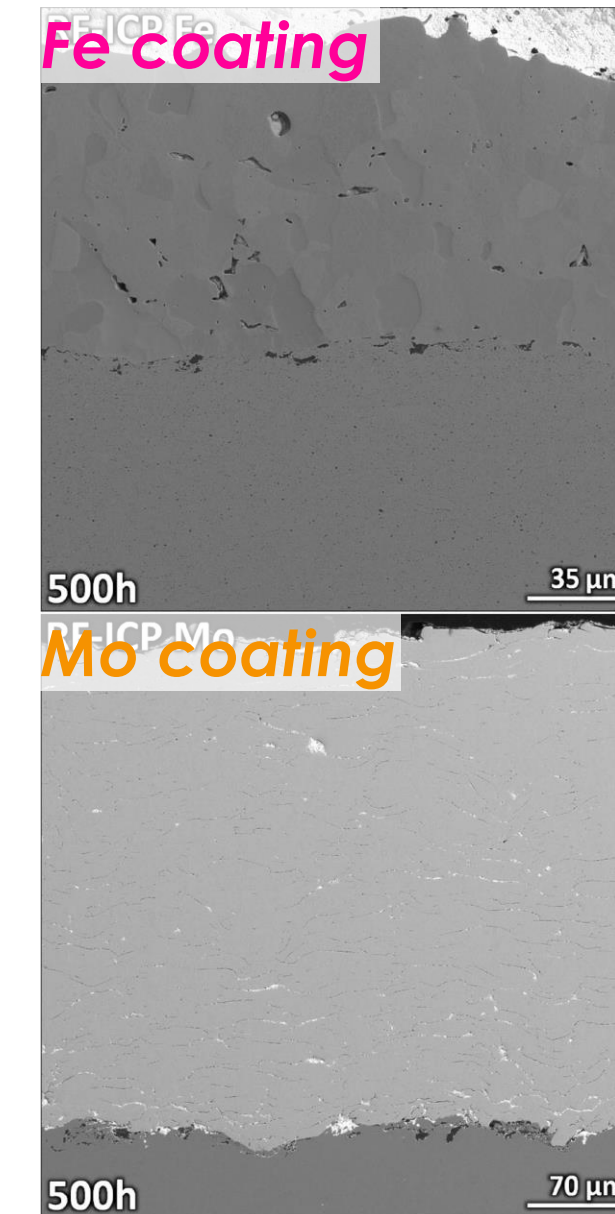
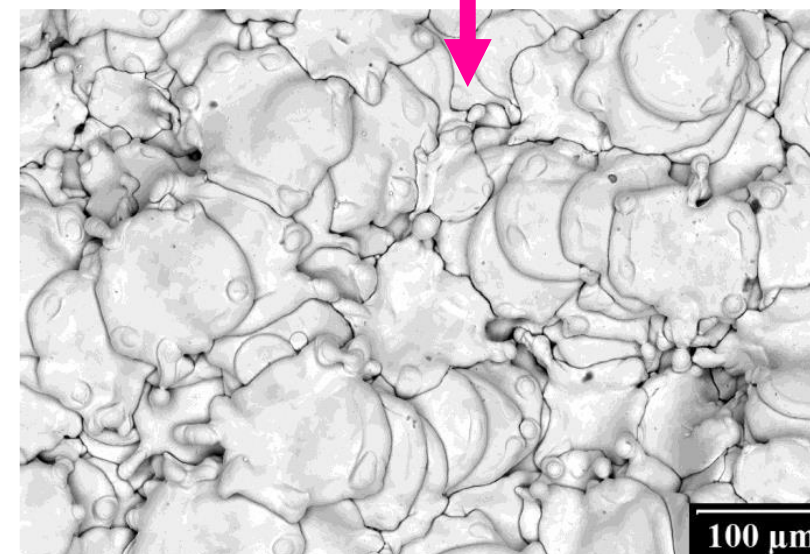
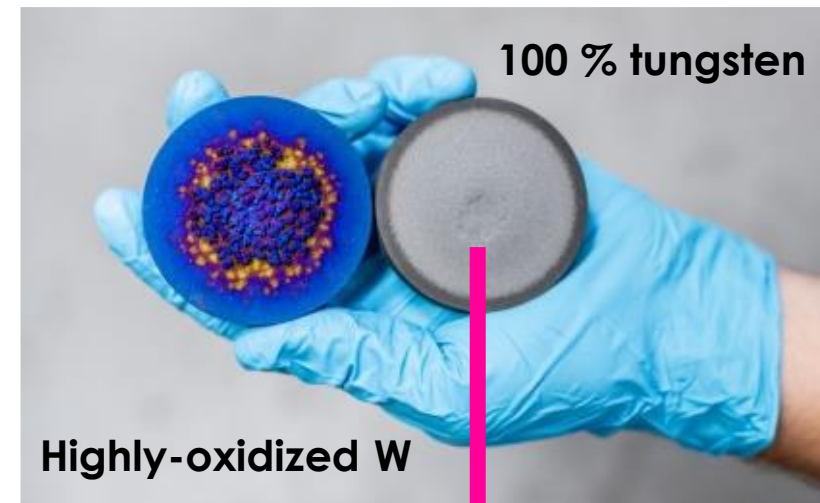
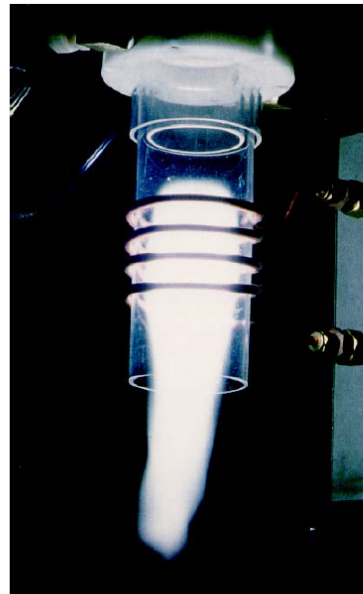
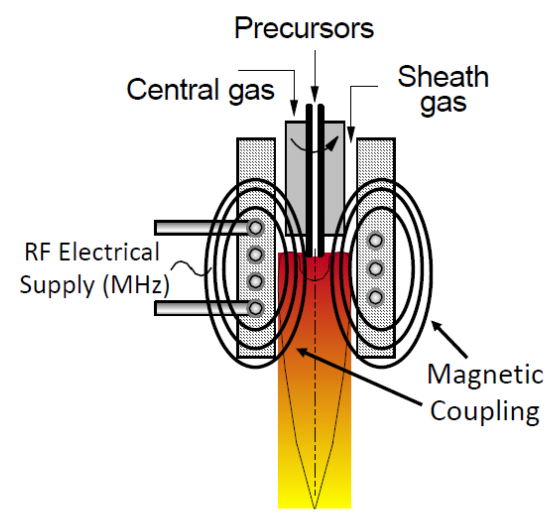
Tested by laser-rig to more than 850 cycles



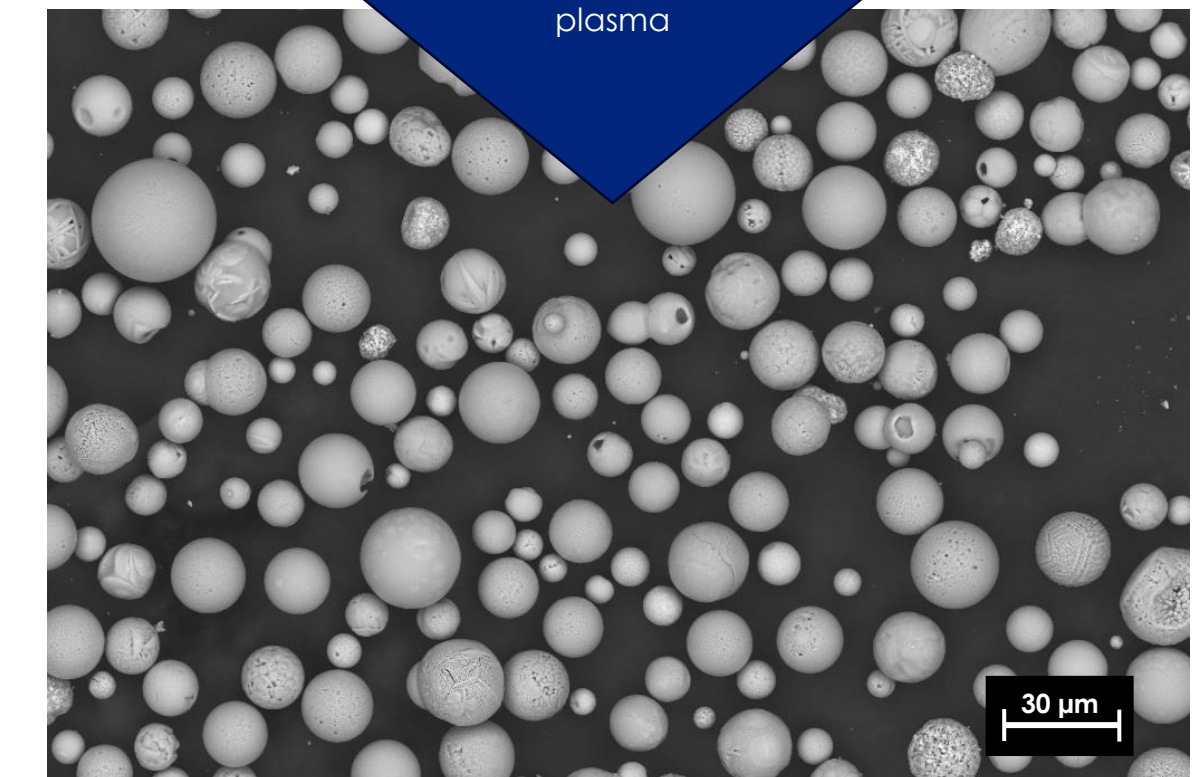
Plasma spraying: RF-ICP

- Deposition in protective atmosphere (Ar, Ar/H₂)
- Ceramic, metallic and composite coatings without oxidation
- Protection against plasma erosion, liquid metal corrosion
- Powder spheroidization and homogenization by remelting

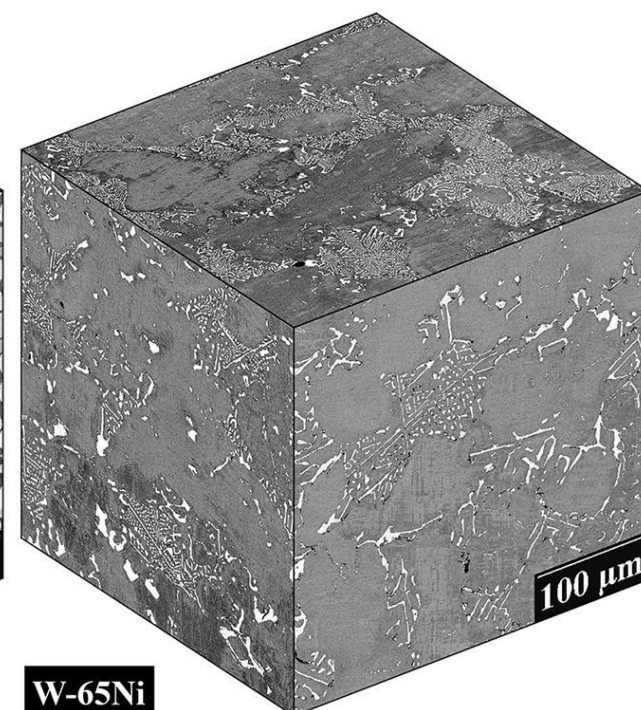
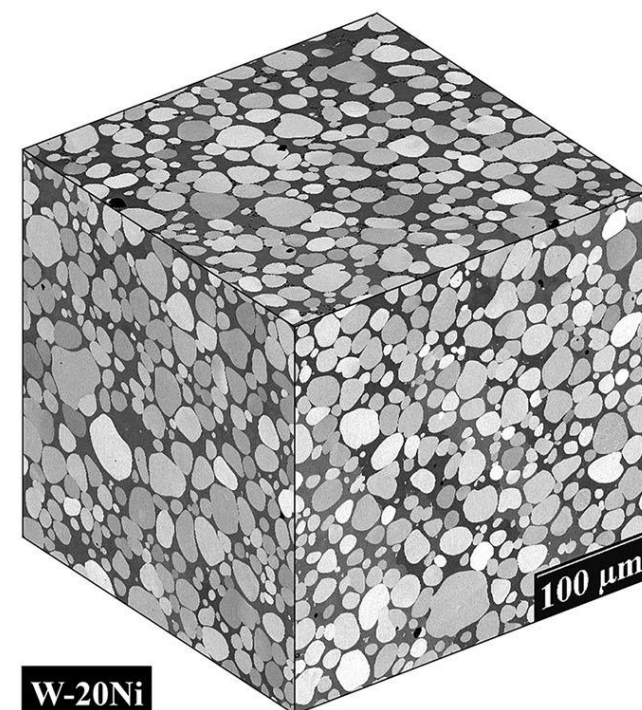
TEKNA Induction Plasma Principle



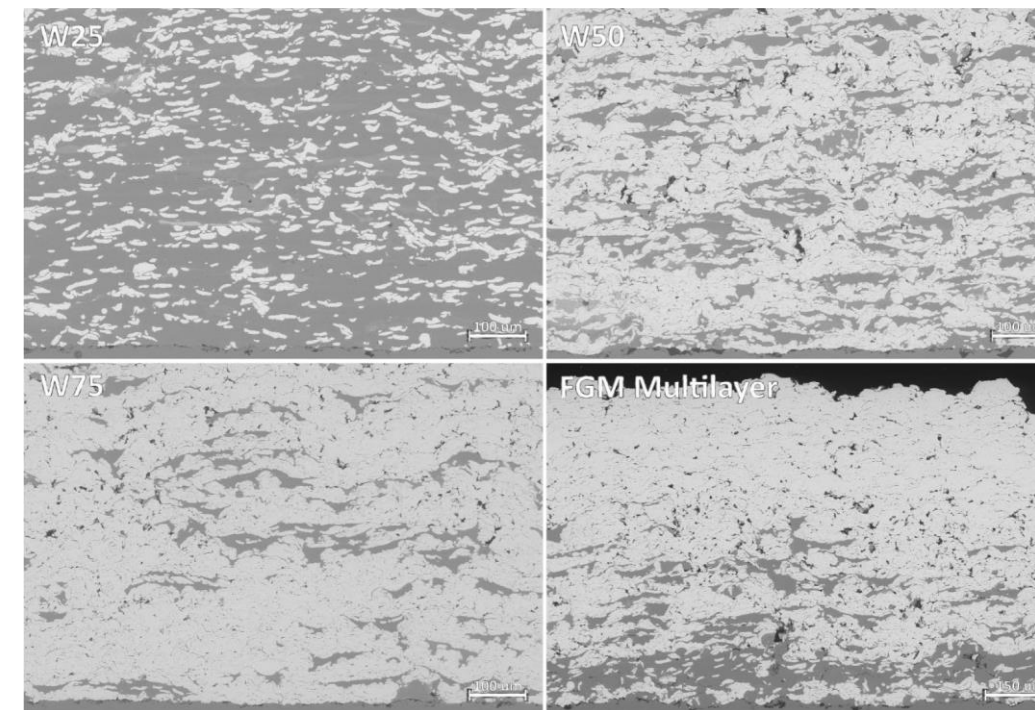
Spheroidization and homogenization of powder by RF-ICP plasma



W-Ni composites

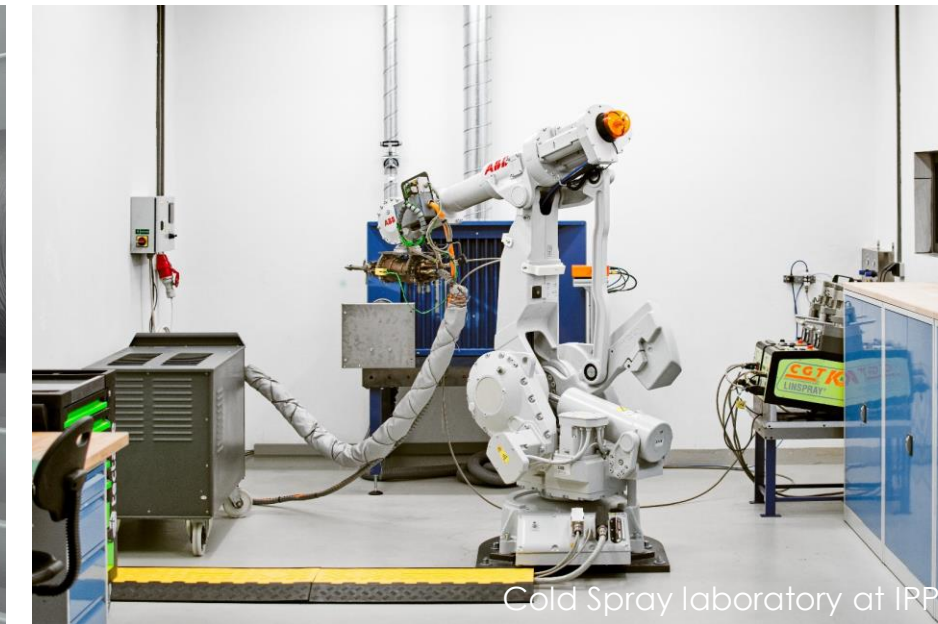
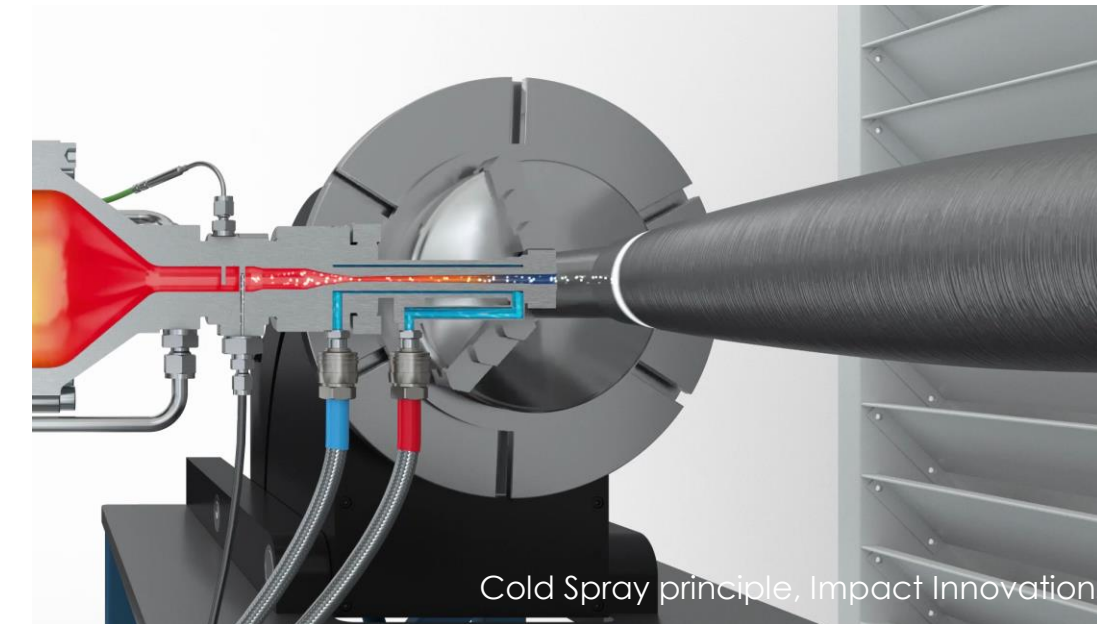


W-316L composites

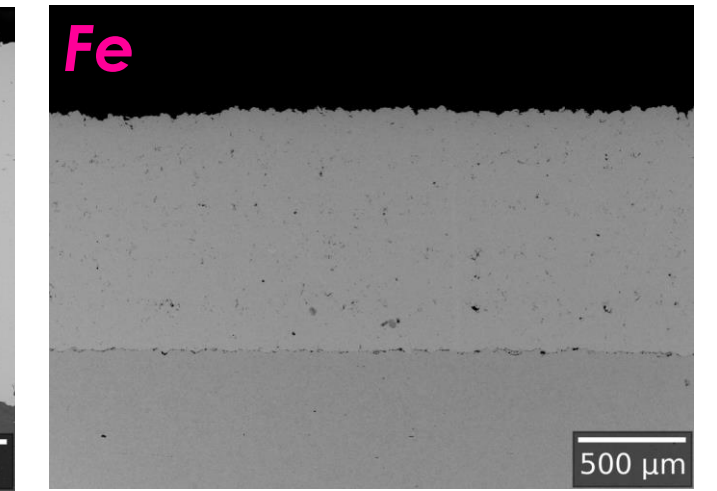
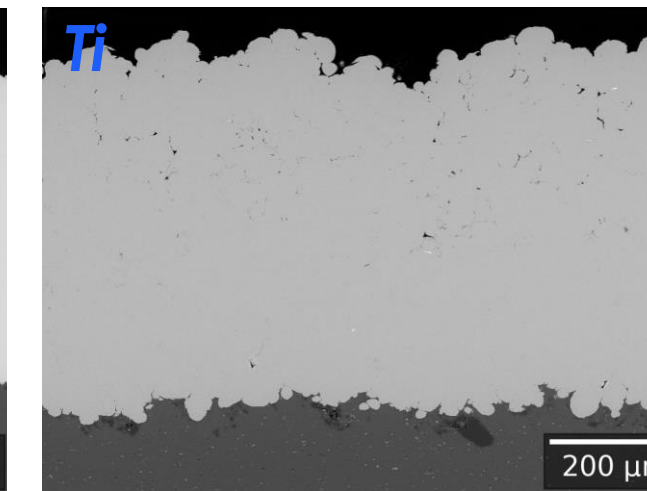
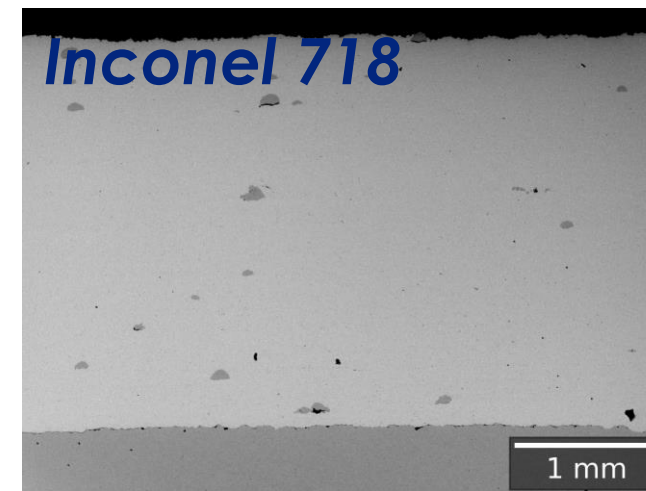
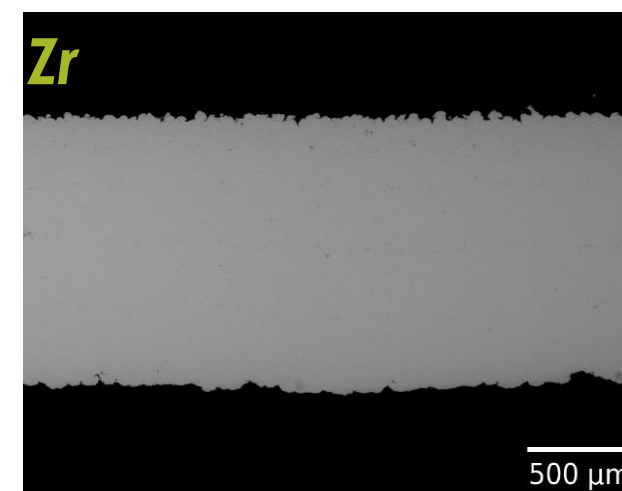


Cold spray: CGT Kinetics 8000-X

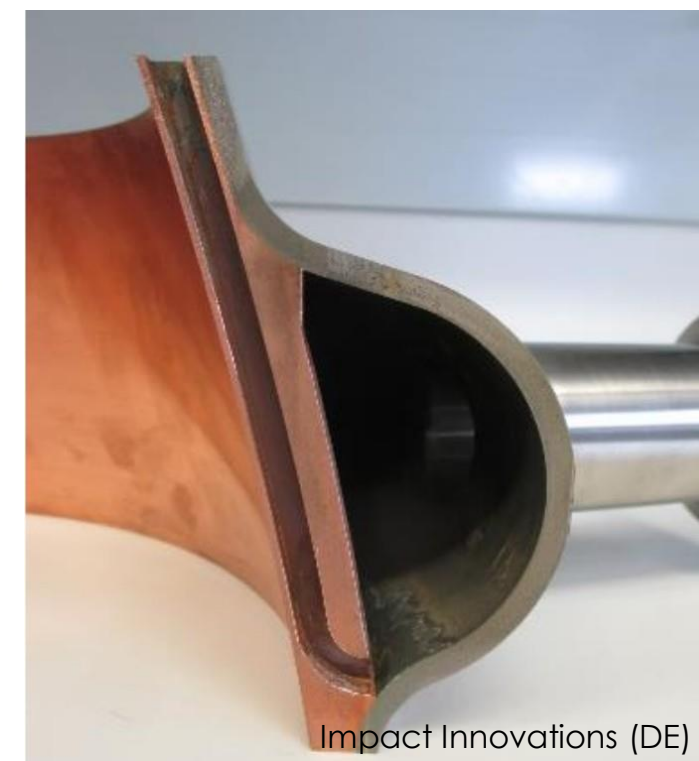
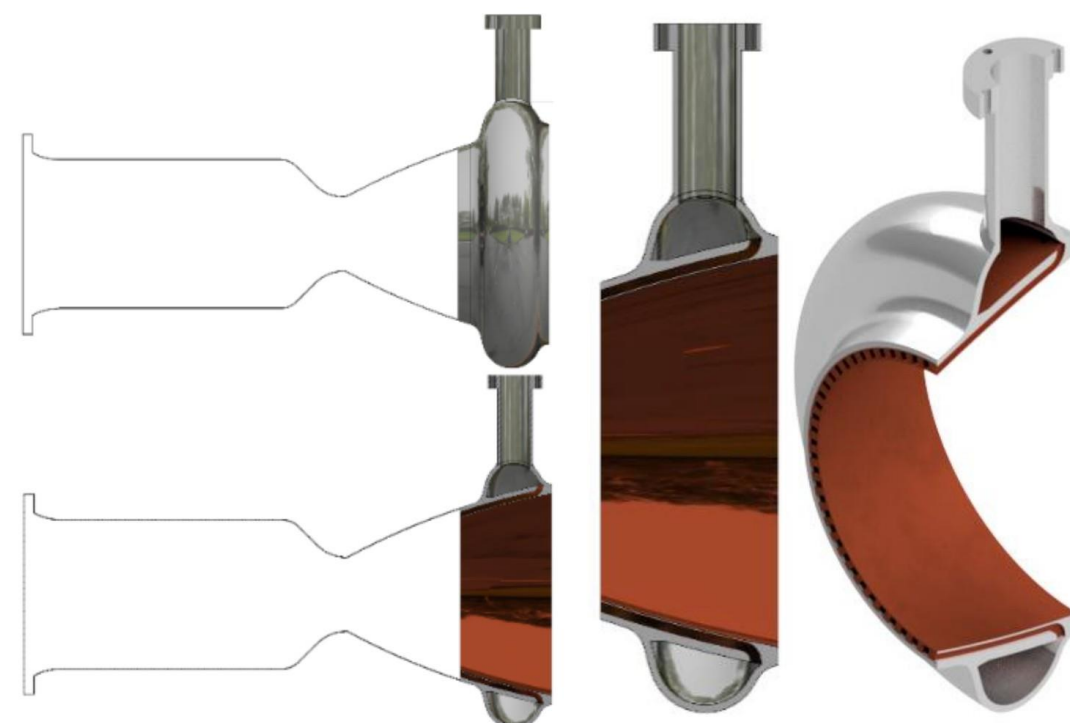
- Deposition in solid state – no feedstock melting (no phase change, no oxidation)
- Metallic, polymeric and metal-matrix deposits – coatings, additive manufacturing, repairs
- High deposition rate and efficiency (up to 99+%)
- Virtually unlimited shape, material combinations, beneficial compressive residual stresses, low porosity, high thermal and electric conductivity



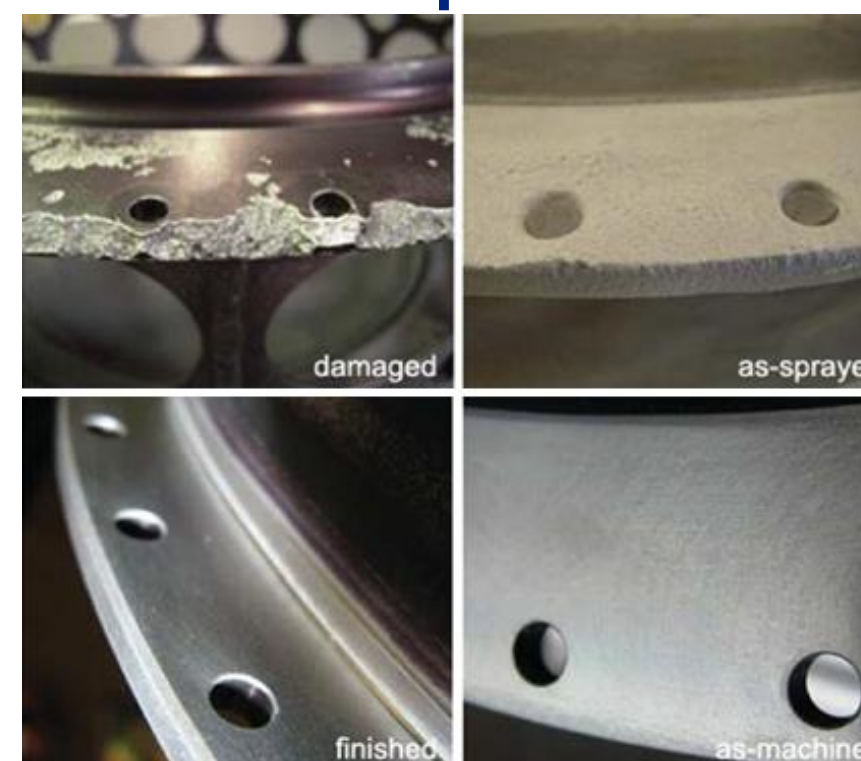
Protective & functional layers



3D print

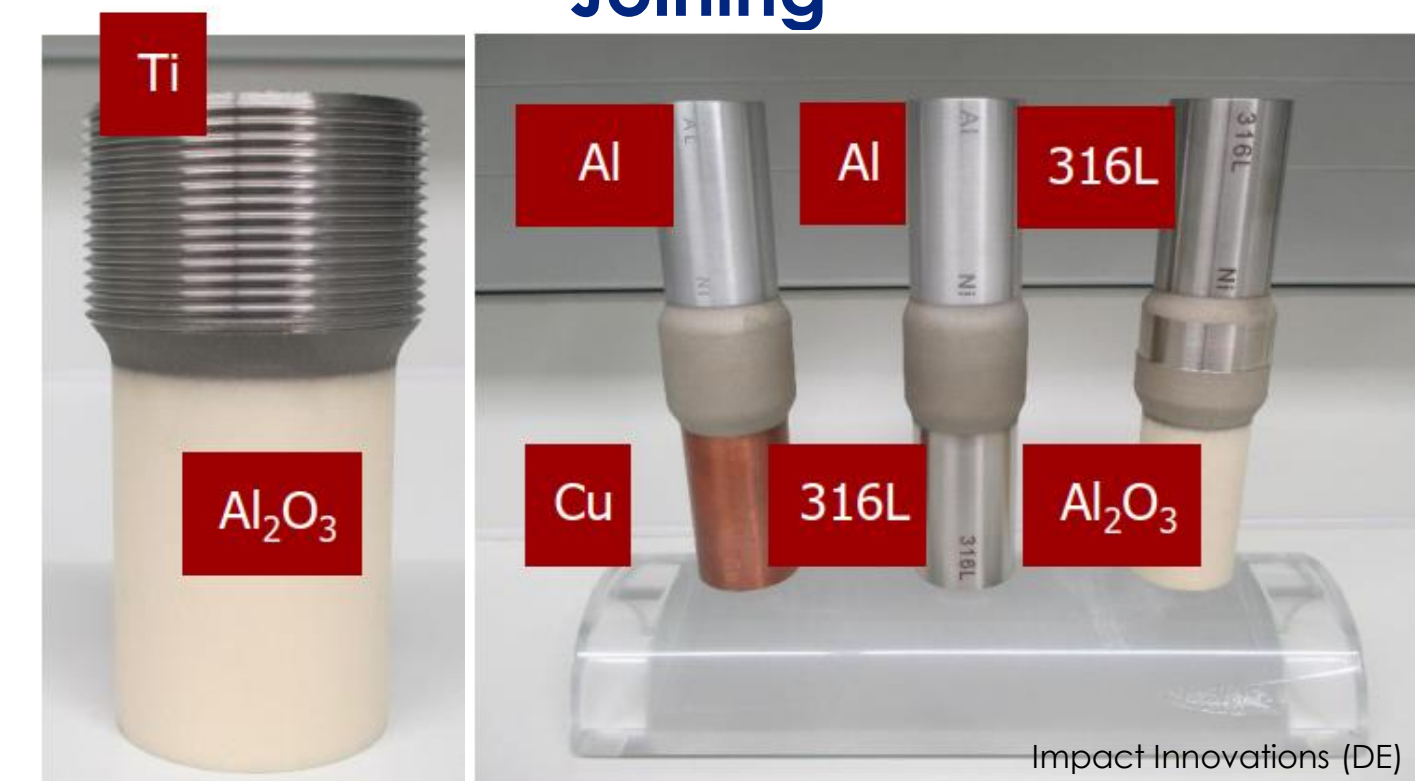


Repair



Schell et al.

Joining



Analytics

Feedstock manipulation and preparation

- Glove boxes
- Powder milling
- Sieving and granulometry
- Suspension analysis



Glove box



Powder mill



Viscometer



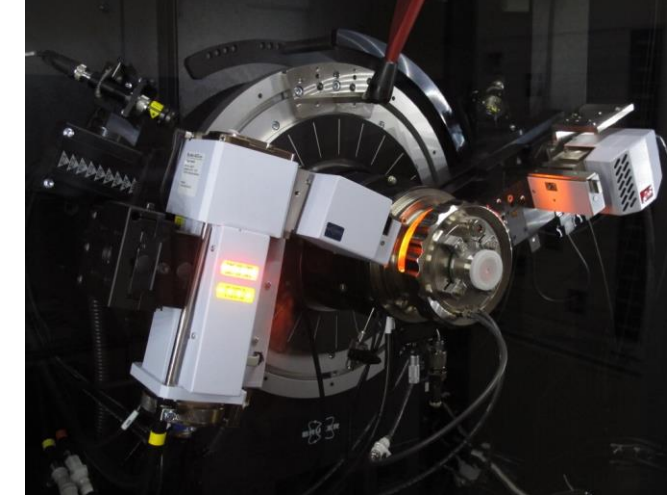
Particle size analyser

Material characterization

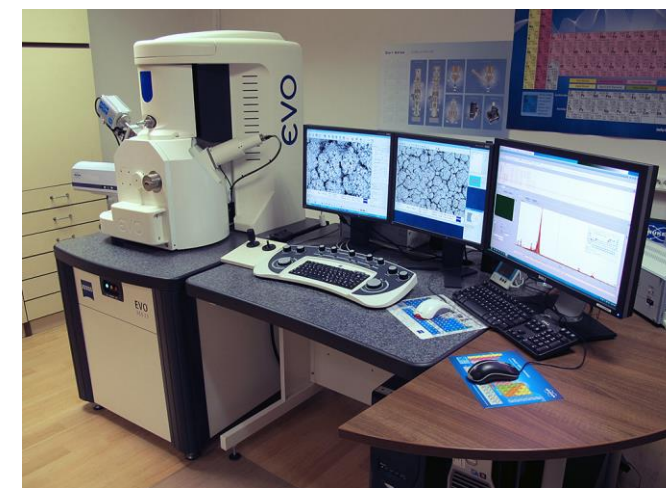
- Metallographic preparation
- HR-SEM
- XRD, XRF
- Light microscopy



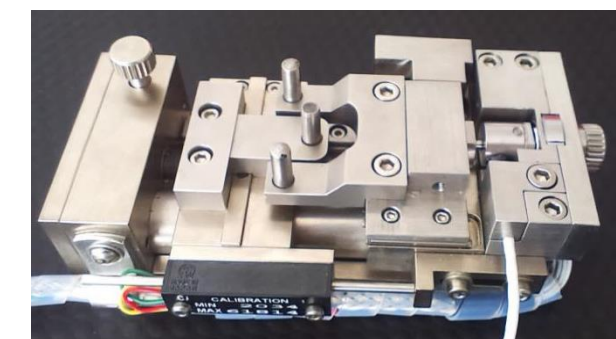
HR-SEM



XRD



SEM



In-situ 3PB, tensile test



Materiallography lab

Mechanical and thermal testing

- Hardness testers
- Universal tensile testing
- Furnaces including thermal cycling,
- Thermal gravimetry, calorimetry, dilatometry



Automatic hardness tester



Tube furnace



TGA/DTA/DSC



Thermal cycling furnace



Rotary tube furnace

...and more!



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