



Technology Metals | Advanced Ceramics

H.C. Starck

Technical Introduction of Manufactures

Noordwijk, 12.10.2016

H.C. Starck Group - Introduction

Leading know-how in processing technology metals and advanced ceramics

H.C. Starck Group GmbH

H.C. Starck Tungsten GmbH



Automotive & Aviation:
Tools, balance weights

Electronics:
Micro drills

Energy:
Wear resistant materials for oil and gas exploration and mining

Medical:
X-ray and radiation shielding for diagnostic equipment

H.C. Starck Tantalum & Niobium GmbH



Electronics:
Capacitors; Sputter targets for barrier layers in semiconductors

Medical:
High-voltage capacitors for e.g. ICDs (implantable cardioverter-defibrillators)

Optics:
Ophthalmic and specialty glasses and lenses

Aviation & Energy:
Superalloy additives for production of turbine parts

H.C. Starck Surface Technology & Ceramic Powders GmbH



Thermal Spray Energy:
Thermal Barrier Coatings for ind. gas turbines

Additive Manufacturing:

Automotive:
rapid prototyping, cladding of valves+shafts

Aerospace:
disk, jet engines

Medical:
orthodontic implants, devices, dental

Fabricated Products



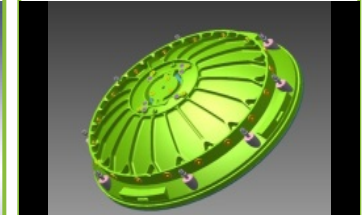
Engineering:
Highly corrosion resistant materials for aggressive chemical environments

Medical:
X-ray and radiation shielding for diagnostic equipment

Renewable Energy:
Sputter targets for thin-film based CIGS

Consumer Electronics:
Sputter targets for LCD & OLED flat panel displays

Advanced Ceramic Components



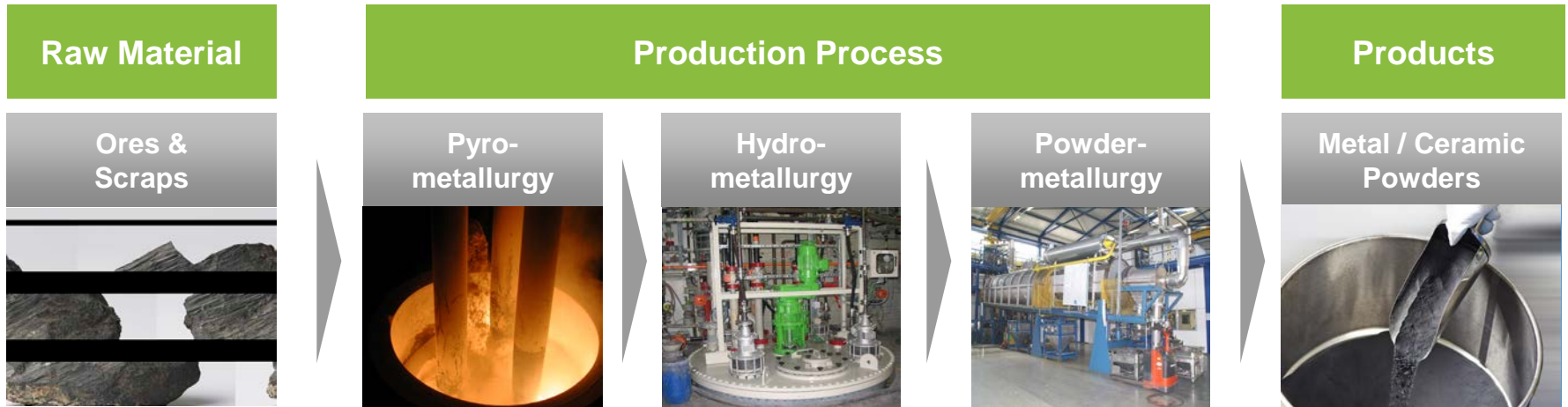
Electronics
Frames for Objectives and measurements for the semiconductor manufacturing process as well as wear parts and waver chucks

Engineering:
Ceramic Engineering Parts, Sealing Parts and Foundry parts

Medical:
Ceramic Parts for dental usage

Technologies in Place

H.C. Starck has unique technologies and equipment to serve high tech market with refractory and ceramic powders



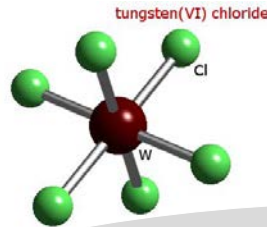
Pyrometallurgy: extraction of valuable materials out of raw materials by melting and thermal treatment

Hydrometallurgy: wet chemical extraction of metals out of raw materials, purification of metal salt solutions and crystallization or precipitations of metal salts

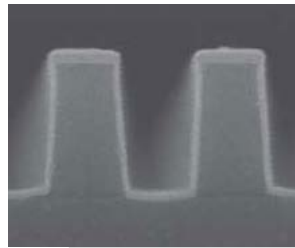
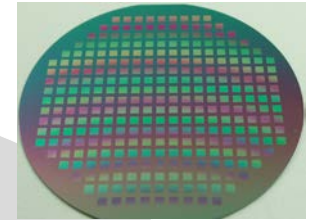
Powder Metallurgy: design of physical properties of powder particles by high temperature reactions, milling, sieving and granulation

Tasks & Capabilities of R&D at H.C. Starck

Refractory pure metals
Alloys (NiNb, TaAl, Al₃Sc*)
Oxides, Chlorides
Oxalates



High Throughput Screening
Material Libraries

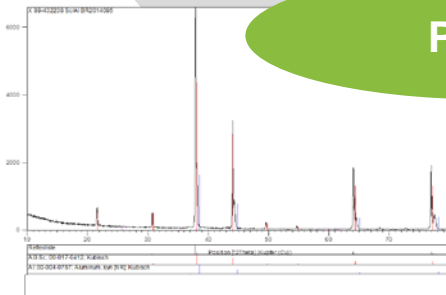


Compositions

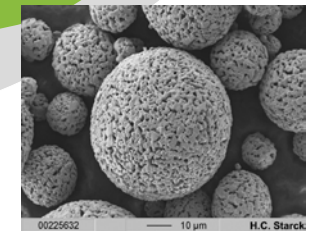
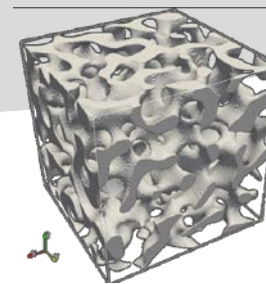
Customer - & Process
Requirements

Purity

Structures



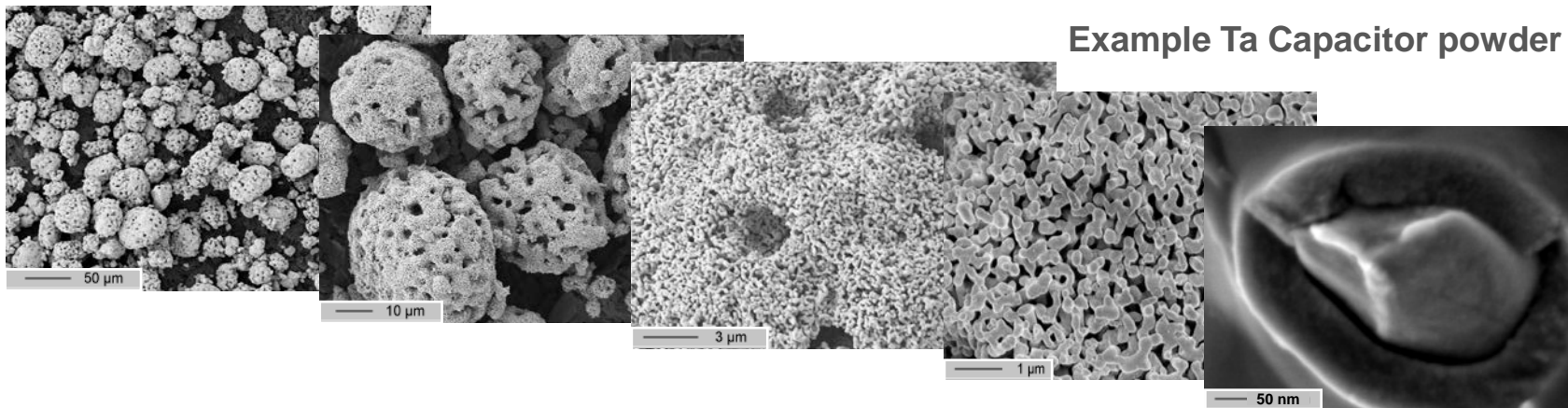
High Purity Metals
Oxides for single Crystal application



Optimized processibility
Oxides for piezo Application

Our Speciality : Tailor Made Powder Structures

Special Know How of H.C. Starck in Particle Design



Macro-

- Particle Size
- Particle Shape
- Particle Size Distribution (PSD)

Meso-

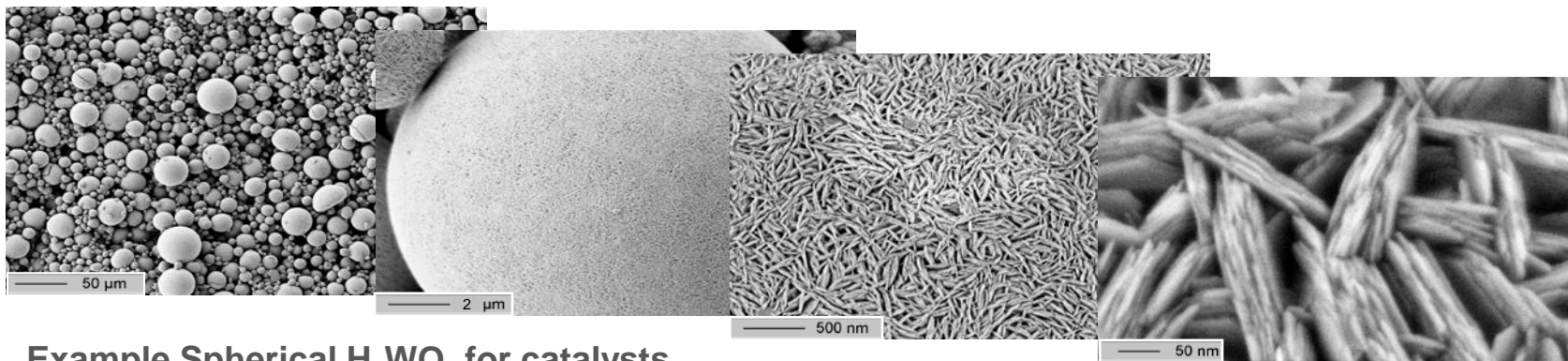
- Grain Size
- Grain Shape
- Porosity

Micro-

- Crystal Structure
- Crystallite Size
- Crystallite Shape

Atomic-Structure

- Vacancies, Interstitials
- Dislocations
- Stacking faults



Example Spherical H₂WO₄ for catalysts

Thank you for your attention!

H.C.Starck 

Dr. Melanie Stenzel

Landsberger Strasse 98
80339 Munich
Germany
www.hcstarck.com