Metal Nanoparticles for the European Industry

Dr.-Ing. Stopić, S., Prof. Dr.-Ing. Friedrich, B.
IME Process Metallurgy and Metal Recycling
Intzestrasse 3, 52 056 Aachen, Germany

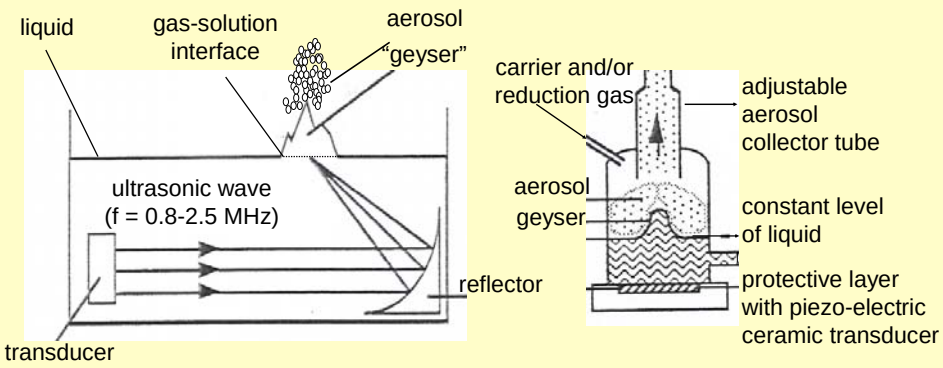
Target

- synthesis of metal nanoparticles e.g. Cu, Ag, Co
- nanosized grain size, high uniformity and big specific surface
- better in many applications than commonly used metal powders

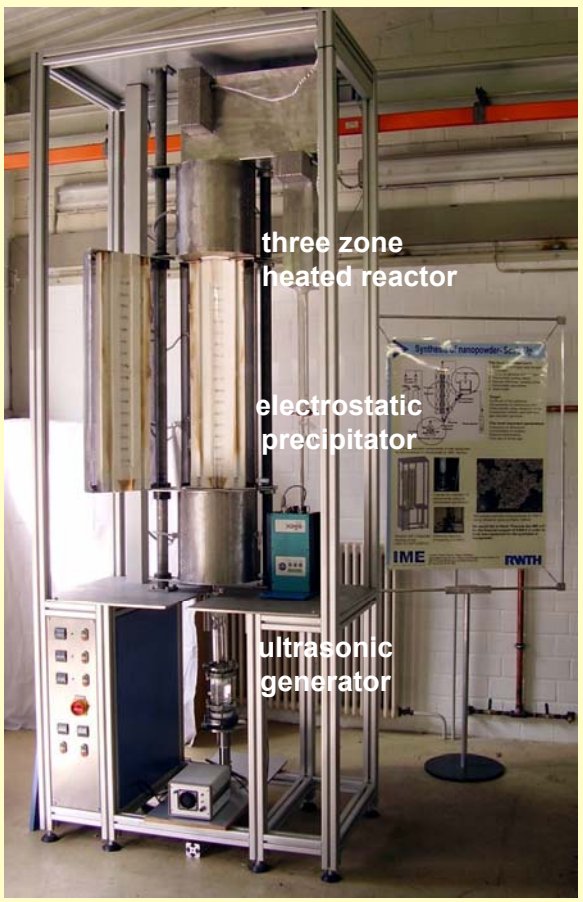
Idea and method

- ultrasonic spray of water-solutions of metal salts (aerosol formation)
- hydrogen gas reduction or thermal decomposition
- use of various metal salt solutions as precursor

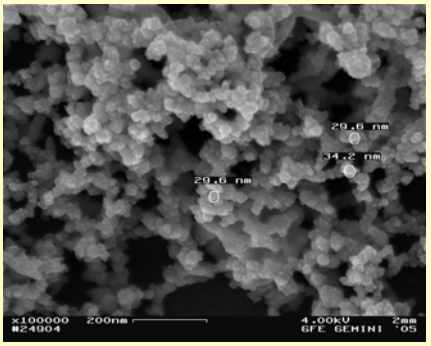
Principle of ultrasonic spray pyrolysis USP



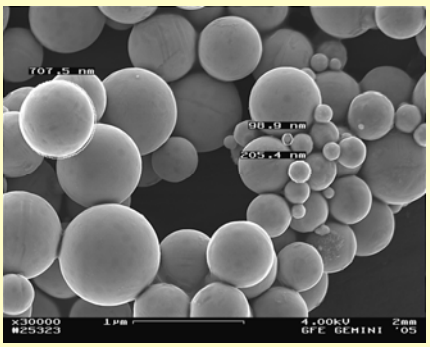
Ultrasonic spray pyrolysis equipment



Copper nanoparticles



Silver nanoparticles



Cobalt nanoparticles

Metal catalysts e.g. Me (Ag, Cu, Co) / ZnO/ Al_2O_3 are industrially employed for methanol synthesis and the water gas shift reaction. The strong increase in catalytic activity is a consequence of the resulting higher metal surface area if nanoparticles are used.

Nanoparticles e.g. of silver may be also used to protect bacterial influence. Nanosized particles have reduced melting and sintering temperatures compared to micron-sized particles and open new applications and processing alternatives.

Nanosized particles of copper could be used as an additive in lubricants for the minimization of an attrition.

In the future applications of metal nanoparticles is expected also in environmental protection.

Contact: nanoworld@ime-aachen.de
Prof. Dr.-Ing. B. Friedrich
IME Process Metallurgy and Metal Recycling
RWTH Aachen University