



Manufacturing of nanoparticles

for e.g. printable electronics

Nanoparticles are commercially available for multiple end uses; however, the price especially of metallic nanoparticles remains high as the scalability of the current methods is poor. Also, current methods do not allow flexible tailoring of the nanoparticle properties. VTT has developed scalable processes based on gas phase synthesis and coating for production and tailoring of metallic nanoparticles.

The solution

VTT's solution is a continuous aerosol phase method that has been developed for the production of metallic nanoparticles. The method enables fast transfer time, online monitoring and good control of the production. Precursors are converted in a one-step process into high-purity products, with the possibility to selectively blend in other nanomaterials. This aerosol-based method uses minimum amounts of energy and water, producing no liquid waste. Materials suitable for production include Ag, Sn, Sn-Bi, Al, Cu, Co, Ni, Fe, and Si. Also bi-metallic nanoparticles can be manufactured.

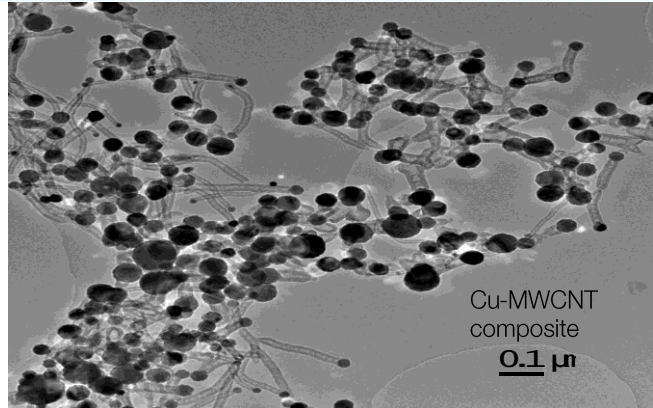
The particles are coated in situ with graphene, copper or other metals, or organic compounds. Copper oxide coatings are applied by a heated Air/N₂ flow.

The benefits

- Clean one-step method
- High production rates of smaller particles
- Good control of the growth of the nanoparticles
- Tailoring of the electric and magnetic properties
- Protection for metallic particles from oxidation
- Functionalization of graphene coatings

Potential application and market areas

- High efficiency nanocomposites for Li⁺ batteries
- High permeability polymer composites for RF antenna substrates
- Composites for microwave heating and EMI shielding
- Magnetic inks for security and authentication
- Conductive copper composite inks
- Magnetic copper and silver coated nanoparticles for water purification
- Functionalized nanoparticles for magnetic cell separation
- Cobalt catalysts for bio-gas conversion
- Mixed oxide catalysts for water electrolysis



Why partner with VTT?

5 reasons for technology partnering with VTT

1. New business and product concepts based on strong IP and world class research
2. Global R&D partnership with 50 Fortune 500 companies
3. Market driven multi-disciplinary solutions
4. Portfolio of more than 1,000 patents and inventions
5. Combined experience of more than 2,000 motivated researchers in eight focused areas of technology

Intellectual property

FI20096317A pending
FI20105126A pending
FI20096162 pending

Additional information

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