NanoFract

MATERIAL DATA SHEET 02 · PARTICLE COATING

# Particles that do more than before.

Mechanical particle coating without heat input and without binders. Thirteen documented material combinations from customer and research projects.

**13**
documented core/shell combinations

**1 mm – 15 mm**
coatable granulate sizes

**0 °C**
additional heat input in the coating process

**continuous**
instead of batch-to-batch as in standard fluidised bed processes

Statements on effects and applications are based on documented customer and research projects 2020–2026 and are presented in generalised form for confidentiality reasons. They are material- and process-dependent and do not constitute warranted properties; binding specifications result from the respective trial coating.

PRINCIPLE

# What the coating does to your powder

Our particle coating works purely mechanically: finer particles are permanently embedded into the surface of larger carrier particles or granulates – without melting, without binders, without additional heat input. The process runs continuously rather than in individual batches and is configured specifically for each material combination. The specific process design is treated as a trade secret while our IP filing is still in preparation.

### No heat input

The layer is formed purely mechanically. Temperature-sensitive additives, active ingredients and polymers stay intact.

### Continuous instead of batch

The process runs continuously rather than in individual batches – shorter throughput times and better economics at larger volumes.

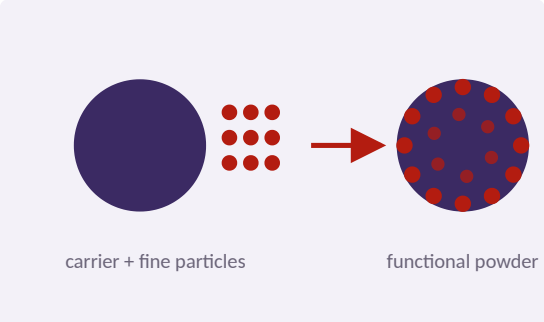
### Compact footprint

The plant needs considerably less floor space than comparable processes of the same capacity – relevant if it is later to stand at your site.

### Homogeneous distribution

Nanoparticles agglomerate into lumps in the compounder. Applied onto the granulate surface they remain individually distributed – the reason masterbatch customers come to us.

**Particle coating**




### Granulate coating

Besides powders we coat granulates from 1 mm to 15 mm – with nano- or microparticles of other materials. This makes material combinations usable for injection moulding and extrusion that could not be homogeneously achieved in a compounding process.

MATERIAL COMBINATIONS

## What we have already coated

All combinations come from real customer or research projects. Customer names are withheld for confidentiality; maturity and volume figures are discussed openly in conversation.

| CARRIER PARTICLE | LAYER | EFFECT ACHIEVED | APPLICATION | MATURITY |
|---|---|---|---|---|
| **Aluminium** | CNT | Increased electrical conductivity | Aluminium castings | Research |
| **Aluminium** | SiC | Increased tensile modulus | Lightweight components | Research |
| **Aluminium** | Graphene | Increased electrical conductivity | Conductive materials | Feasibility |
| **Iron** | Polyamide | High metal loadings with processability retained | Extrusion and injection moulding of metal-filled compounds | Samples delivered, series demand indicated |
| **Iron / steel** | ABS or PMMA | Improved flowability and bulk density for powder-bed processes | Metal powders for additive manufacturing | Samples delivered |
| **Polyamide** | CNT | Increased tensile strength | Engineering plastic parts | Samples delivered, series demand indicated |
| **Polypropylene / HDPE** | functional nanoparticles | Nanoparticles stay individually distributed on the granulate surface instead of agglomerating in the kneader | Masterbatch for injection moulding and extrusion | Samples delivered, series demand indicated |
| **Cement** | Biochar nanoparticles + CNT | Increased thermal storage capacity | Construction materials, $CO_2$-certified systems | Ongoing trials |
| **Magnetite** | ABS / $TiO_2$ | Whitening of a pitch-black mineral, extrudability | Filler compounds on light surfaces, extruded semi-finished products | Samples delivered |
| **Refractory metal** | TiC | Increased wear resistance | 3D printed components | Samples delivered |
| **Refractory metal** | Metal-polymer layer | Controlled use of the skin effect in an electromagnetic field | Cold spray with microwave assistance, tool steel repair | Under development |
| **Ceramic** | Polymer | Defined sintering behaviour, printability in powder-bed processes | High-temperature ceramic components from additive manufacturing | Ongoing project |
| **Activated carbon** | biogenic fine particles | Surface and adsorption behaviour deliberately modified | Filter and adsorber systems | Feasibility |

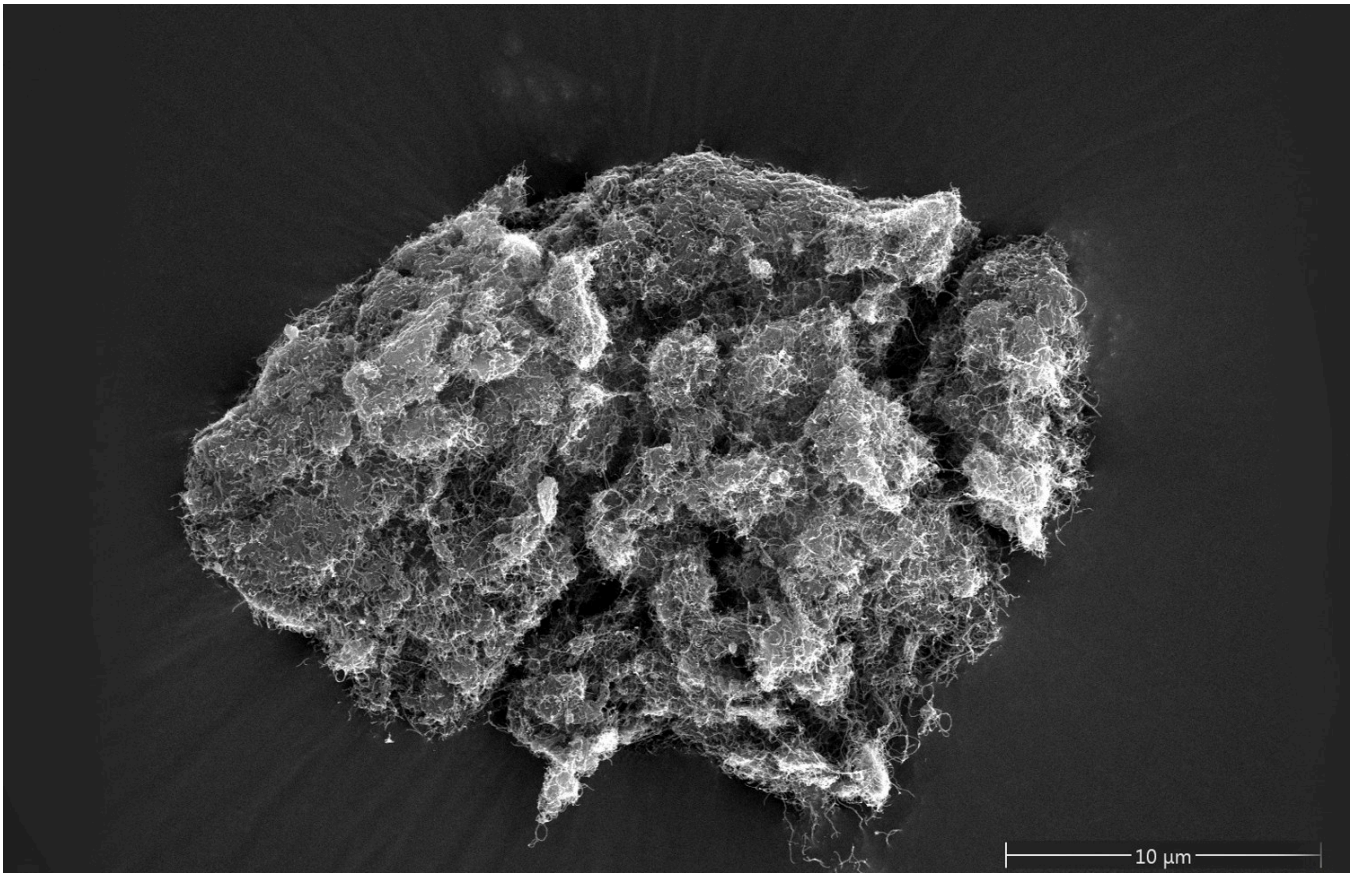
WORKING TOGETHER

# From sample to licence

| | |
|---|---|
| **1 · Feasibility** | Trial coating of your material combination, typically at gram to kilogram scale, with documentation. |
| **2 · Process development** | Definition of a reproducible process window: layer thickness, adhesion, mixing ratio, morphology, processing behaviour. |
| **3 · Small series** | First quantities for your component and process validation. |
| **4 · Repeat programme** | Recurring supply against a released specification. |
| **5 · Plant and licence** | Transfer of the process to a coating plant at your site – including process know-how and licence. |

## Confidentiality

The process design and material-specific know-how are trade secrets and the subject of an IP filing in preparation. We treat development results from customer projects with the same care – under NDA before the first sample if you prefer.




Scanning electron micrograph: aluminium particle mechanically coated with carbon nanotubes. The nanotubes sit individually on the particle surface rather than as an agglomerate. Scale bar: 10 µm.

## Which combination do you need?

Tell us the carrier material, the intended layer and the effect you want to achieve. We will tell you whether it works – and coat a sample.

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