NanoFract

MATERIAL DATA SHEET 02 · PARTICLE COATING

Mechanical particle coating.

Finer particles are mechanically embedded into the surface of larger carrier particles or granulates – without binders and without additional heat input. Thirteen documented material combinations, all trialled in-house.

13
documented carrier/layer combinations, 2020–2026

1 – 15 mm
granulate sizes for which coatings are documented

0 K
additional heat input in the coating process – the layer is formed purely mechanically

continuous
continuous process instead of batch operation

Information on objectives and fields of application is based on documented material combinations trialled in-house (2020–2026) and is presented in generalised form for reasons of confidentiality. It is material- and process-dependent and does not constitute a guaranteed property; binding specifications result from the respective trial coating and its documentation.

PRINCIPLE

What the coating does to your powder

Our particle coating works purely mechanically: finer particles are embedded into the surface of larger carrier particles or granulates – without melting, without binders, without additional heat input. The process runs continuously and is designed individually for each material combination. The specific process route is treated as a trade secret.

No additional heat input

The layer is formed purely mechanically, without melting. This is relevant for temperature-sensitive additives and polymers.

Continuous instead of batch

The process runs continuously rather than in individual batches. This shortens throughput times for larger quantities.

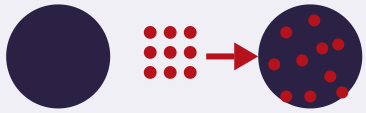
Compact design

The plant has a compact design – relevant if it is later to be installed at your site. Footprint and capacity figures are given per project.

Distribution on the surface

The aim of the coating is to fix fine particles distributed on the carrier surface rather than introducing them as agglomerates. We document the distribution by SEM image (example on page 4).

Particle coating



carrier + fine particles — coated particle

Granulate coating

In addition to powders we coat granulates from 1 mm to 15 mm with nano- or microparticles of other materials – as a precursor for material combinations in injection moulding and extrusion.

Substance law and safety

Substances used, such as carbon nanotubes, metal powders or nanoparticles, are subject to the applicable classification and information obligations (CLP, REACH). Every sample delivery includes the safety and classification information required for this; handling instructions are agreed with you per project.

MATERIAL COMBINATIONS

What we have already coated

All combinations have been trialled in-house. We do not name customers. The column “Objective” describes the aim pursued in each case – not a guaranteed property. We discuss measured values, maturity and quantities in conversation, as far as contractually possible.

CARRIER PARTICLE	LAYER	OBJECTIVE IN THE PROJECT	FIELD OF APPLICATION	STATUS
Light metal powder (aluminium)	Carbon nanotubes (CNT)	Electrical conductivity	Casting applications	Research
Light metal powder (aluminium)	Ceramic hard material (SiC)	Mechanical properties (stiffness)	Lightweight components	Research
Light metal powder (aluminium)	Graphene	Electrical conductivity	Conductive materials	Feasibility
Metal powder (iron-based)	Thermoplastic (polyamide)	Processability of metal-filled compounds	Extrusion and injection moulding of metal-filled compounds	Sample delivery
Metal powder (iron / steel)	Thermoplastic (ABS, PMMA)	Flowability and bulk density for powder-bed processes	Metal powders for additive manufacturing	Sample delivery
Engineering thermoplastic (polyamide)	Carbon nanotubes (CNT)	Mechanical properties (strength)	Technical polymer components	Sample delivery
Polymer granulate	Functional nanoparticles	Individual distribution of nanoparticles on the granulate surface	Masterbatch for injection moulding and extrusion	Sample delivery
Mineral binder (cement)	Biochar fine particles + CNT	Thermal properties (heat storage)	Construction material systems	Testing
Mineral powder (magnetite)	Thermoplastic + white pigment (TiO_2)	Colouring of a dark mineral, extrudability	Filler compounds, extruded semi-finished products	Sample delivery
Refractory metal powder	Hard material (TiC)	Abrasion resistance	Additively manufactured components	Sample delivery
Metal powder (ferromagnetic, iron-based)	Electrically insulating polymer layer	Electrically insulated individual particles	Additive manufacturing of magnetic flux concentrators	Sample delivery
Ceramic powder	Polymer	Sintering behaviour and processability in the powder bed	Additive manufacturing of ceramic components	Ongoing project
Activated carbon	Biogenic fine particles	Surface and adsorption behaviour	Filter and adsorber systems	Feasibility

Status: “Research” and “Feasibility” denote laboratory trials without sample delivery; “Sample delivery” denotes the delivery of documented samples to a project partner; “Testing” and “Ongoing project” denote projects not yet completed. None of the entries denotes a series product.

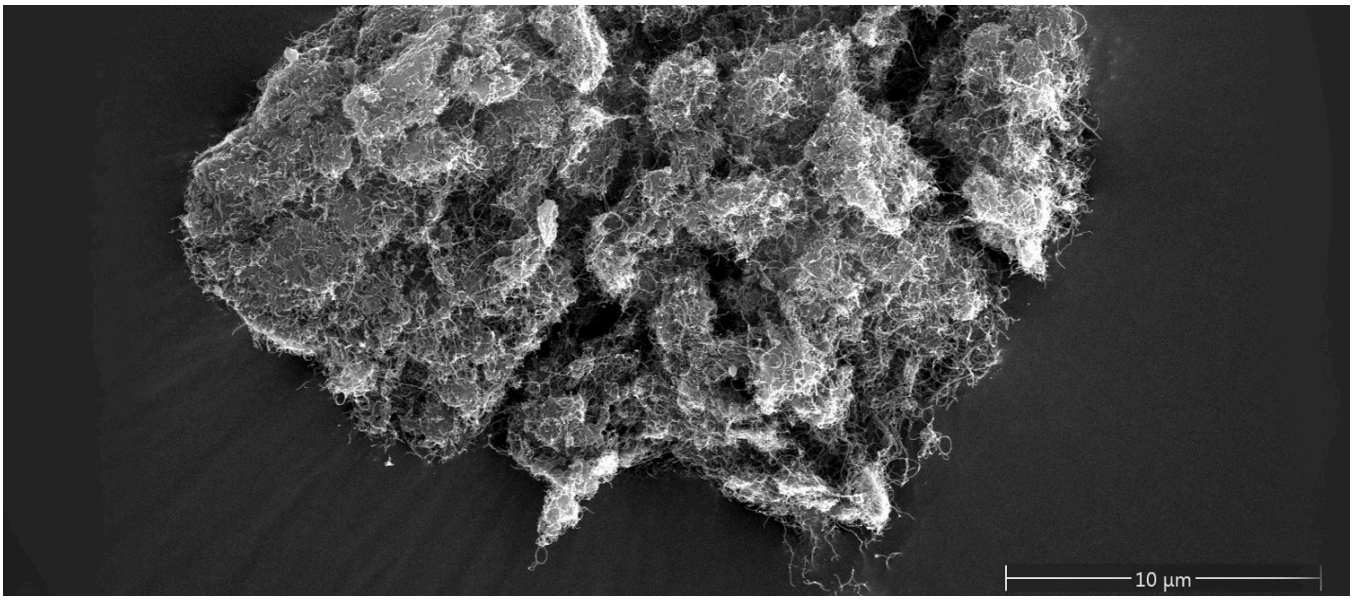
WORKING TOGETHER

From sample to customer plant

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

Confidentiality

The process route and the material-specific experience are trade secrets. We treat development results from customer projects confidentially – on request we conclude a non-disclosure agreement before the first sample.



Scanning electron micrograph: aluminium particle, mechanically coated with carbon nanotubes. The nanotubes lie on the particle surface. Scale bar: 10 µm. Example image from a research project.

Which combination do you need?

Tell us the carrier material, the desired layer and the objective. We check feasibility and coat a sample – with documentation.

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