Temperature-stable fluorescent tracer particles

Cost-efficient, temperature-stable fluorescent ceramic tracers for precise phase differentiation and reflection-free optical analysis.

STATUS QUO

Optical (multiphase) flow analyses, e.g., via Particle Image Velocimetry, are often limited by reflections and insufficient phase separation. Fluorescent tracers offer a solution, yet established products are thermally unstable and/or economically unfeasible due to high costs. This severely restricts their application under demanding thermal conditions and in large-scale trials, preventing precise differentiation between gas and dispersed phases.

OUR TECHNOLOGY

These novel ceramic fluorescent tracers are significantly more cost-efficient and temperature-stable than conventional polymer particles. Targeted surface functionalization with a fluorescent dye enables precise, selective capture of gas-phase velocity fields in methods such as Particle Image Velocimetry (PIV). Furthermore, the temperature-dependent fluorescence intensity allows for simultaneous, local temperature determination directly within the flow following calibration.

BENEFITS

- ► Cost-efficient manufacturing process
- ► Temperature-stable base material
- ► Scalability of the production process

APPLICATION POSSIBILITIES

- Precise capture of gas-phase velocity in multiphase flows.
- Reflection-free measurements.
- Spatially resolved determination of local ambient temperatures.

COMMERCIALIZATION OPPORTUNITIES

There are various possibilities for cooperation between the industrial partner and TU Darmstadt: from an exchange with the know-how carriers of the technology up to a close cooperation in case of further development needs. The technology is protected by intellectual property rights and can be used by the industry partner after a sale or licensing agreement.

CURRENT STAGE OF DEVELOPMENT TECHNOLOGY READINESS LEVEL (TRL)

9	Product ready to launch
8	
7	Prototype
6	
5	
4	
3	Proof of Concept
2	
1	Idea

The technology development is at Level 6: Reliable flow analyses have already been validated under real-world conditions

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