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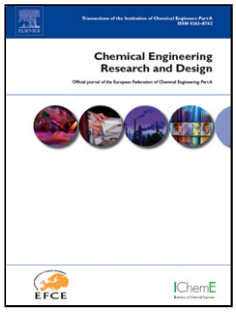

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Impact behaviour of microparticles with microstructured surfaces: Experimental study and DEM simulation

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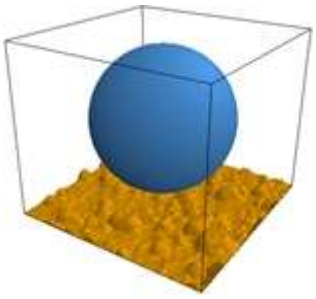
Graphical abstract



Highlights:

- Influence of the surface topographical microstructure on the particle impact behaviour
- Application of the cold spray process to manufacture a defined microstructure
- Novel setup for the measurement of the restitution coefficient for fine particles
- Implementation of the real surface topography in a DEM model

Abstract

The surface topography of a component influences lots of important macroscopic phenomena, for example friction, fatigue and wear behaviour. This study is focused on the effect of surface topography on the collision behaviour of fine particles. To obtain this behaviour an experimental study of the single particle impact with a microstructured substrate was performed. A novel experimental setup was developed to capture collisions of small particles with the surface three-dimensionally. The particle-wall collisions were performed with spherical polystyrene microparticles. As contact partners a polished and a microstructured stainless steel substrate were used. The surface microstructure was produced by a cold spray process with spherical stainless steel particles. The measured restitution coefficient significantly