

SmartCERIALS

SmartCERIALS – Smart CERium dioxide-based nanocomposites for Antimicrobial Surface applications

Programm / Ausschreibung	Produktion der Zukunft, 40. AS Produktion der Zukunft 2021 China CAS	Status	abgeschlossen
Projektstart	01.03.2022	Projektende	28.02.2025
Zeitraum	2022 - 2025	Projektlaufzeit	36 Monate
Keywords	green production, safe-and-sustainable-by-design, SSbD, nanoceria, nanogold, zinc oxide, SERS, fluorescence, antiviral, antibacterial, multifunctional surface coating		

Projektbeschreibung

The overall AIM of this proposal is the green development of novel nanocomposite raw materials for smart surface coatings by additive synthesis of different nanomaterials allowing the combination of different desired functionalities. These combined functionalities comprise, first and foremost, superior anti-microbial (antibacterial and antiviral) properties that can be monitored for, second, microbial binding and deactivation using Raman spectroscopy and, third, for coating stability by fluorescence. This complex task will be achieved by three OBJECTIVES in layered priority:

- (i) at highest priority we will investigate the potential of enhancing the anti-microbial properties (higher affinity for bacterial and viral antigens, improved pathogen deactivation, faster degradation) of Ag-free, ZnO-based nanomaterials by addition of CeO₂ nanomaterials;
- (ii) we will evaluate the capacity to enable in situ monitoring of microbial binding and antigen decomposition by Raman spectroscopy (SERS) by incorporation of nanogold;
- (iii) we aim to include a fluorescence-based stability-tracing feature by integration of Cd-free quantum dots into the nanocomposite raw material.

Concomitant with the technological development, comprehensive safety and sustainability assessment will be conducted in line with the “Safe-and-Sustainable-by-Design” and the “Green Deal” concepts for innovation of advanced materials in the European industrial realm.

Abstract

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Projektkoordinator

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