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Safer-By-Design Doped Pyrogenic Silica Nanoparticles

Tech ID: 24587 / UC Case 2014-783-0

INNOVATION

Professor Andre Nel and colleagues have identified pyrogenic (fumed) silica nanoparticles (NPs) as a potentially hazardous form of non-crystalline silica, and have developed safer-by-design strategies to enhance the biocompatibility of fumed silica. The team demonstrated that the high cytotoxic potential fumed silica is the result of formation of highly reactive surface silanols during high temperature flame spray pyrolysis. By doping the fumed silica during pyrogenic synthesis with small amounts of metal oxide dopants, the team has demonstrated a drastic reduction in the reactive surface silanol groups that contribute to oxygen radical production, decreased cell viability and pro-inflammatory responses (e.g., IL-1 β production). In spite of the reduced surface reactivity, the safer designed fumed silica materials maintain most of their desirable material characteristics. These physicochemical attributes should enable the doped materials to be used as a safer alternative in many applications (e.g., fillers, thickeners, desiccants, abrasives, and anti-caking agents) by the tire, cosmetic, and food industries.

PATENT STATUS

Patent Pending

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Silica nanoparticles, biocompatibility, inflammation mitigation

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Health
 - ▶ Industrial/ Energy
- ▶ **Environment**
 - ▶ Other
 - ▶ Remediation
- ▶ **Medical**
 - ▶ Disease: Autoimmune and Inflammation
- ▶ **Nanotechnology**
 - ▶ Materials
 - ▶ NanoBio

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