International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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Self-disinfecting Nanoparticle Coated Face Masks for Combating COVID-19

Overview

Masks are playing a major role as personal protective equipment needed to fight against the COVID-19 pandemic. Ag-Cu/CuO nanoparticles have been coated on fabrics by two different processes including nano-suspension coatings using nanopowders synthesized by Flame spray pyrolysis (FSP) and electroless coating process. Prototype masks are prepared for demonstration as shown in figure 1(a). Very uniform coatings have been achieved on the fabric by both processes (Figure 1 (b)). The nanoparticles coated fabrics are tested for their antibacterial efficacy using ASTM E2315 (99.7% disinfection of bacteria in 30 seconds) as shown in Figure (c) and anti-viral (SARS CoV-2) efficacy. The nanoparticles coated fabrics are found to exhibit anti-bacterial properties even after 30 washes and anti-viral properties showed more than 75% efficacy compared to uncoated fabric.

Key Features

- Scalable process
- Antibacterial efficacy : 99.7 % in 30 sec
- Anti-viral (SARS CoV-2 efficacy :) > 75% compared to uncoated fabric
- Cost effective

Potential Applications

- Self-disinfection mask
- Personal protective equipment (PPE)
- Hospital textiles

Technology Readiness Level (TRL)

- Scale-up to pilot scale
- Validated for antibacterial and antiviral efficacy

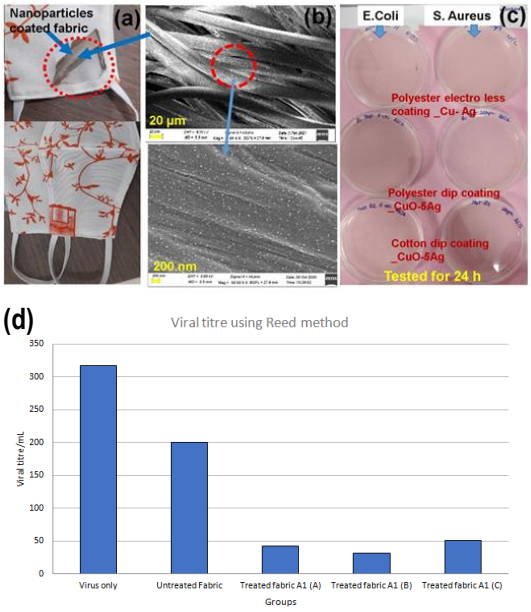

Figure 1: (a) Prototype masks showing nanoparticle coated fabric, (b) (b) FESEM images of nanoparticle coated fabrics and (c) Antibacterial testing of nanoparticle coated fabrics using ASTM E2315 (d) anti-viral efficacy of nanocoated fabric.

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	*Basic concepts and understanding of underlying scientific principles*	*Short listing possible applications*	*Research to prove technical feasibility for targeted application*	*Coupon level testing in stimulated conditions*	*Check repeatability/ consistency at coupon level*	*Prototype testing in real-life conditions*	*Check repeatability/ consistency at prototype level*	*Reassessing feasibility (IP, competition technology, commercial)*	*Initiate technology transfer*	*Support in stabilizing production*
Status										

IPDI : Intellectual Property Development Indices

Major Publications: Indian patent draft under preparation

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