

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202521076034 A

(19) INDIA

(22) Date of filing of Application :11/08/2025

(43) Publication Date : 29/08/2025

(54) Title of the invention : SINGLE STEP IN-SITU GREEN METHOD FOR FUNCTIONALIZATION OF COTTON FABRIC WITH SILVER NANOPARTICLES USING BANANA PEEL EXTRACT

<p>(51) International classification :A61K0036880000, D06M0101060000, A61K0033380000, C05G0003800000, B22F0009240000</p> <p>(86) International Application No :NA Filing Date :NA</p> <p>(87) International Publication No : NA</p> <p>(61) Patent of Addition to Application Number :NA Filing Date :NA</p> <p>(62) Divisional to Application Number :NA Filing Date :NA</p>	<p>(71)Name of Applicant : 1)DR. ANIL NATHU KULKARNI Address of Applicant :DEPARTMENT OF PHYSICS, G T PATIL ARTS COMMERCE AND SCIENCE COLLEGE NANDURBAR-425412, MAHARASHTRA, INDIA. ----- 2)DR. BABASAHEB R. SANKAPAL 3)DR. MANOJKUMAR M. JADHAO 4)MR. NILESH DILIP JADHAV 5)MR. VISHAL V. LONIKAR 6)DR. SUPRIYA JOSHI 7)DR. VINOD S. KHAINAR 8)DR. VISHAL GOKUL BELDAR Name of Applicant : NA Address of Applicant : NA</p> <p>(72)Name of Inventor : 1)DR. ANIL NATHU KULKARNI Address of Applicant :DEPARTMENT OF PHYSICS, G T PATIL ARTS COMMERCE AND SCIENCE COLLEGE NANDURBAR-425412, MAHARASHTRA, INDIA. ----- 2)DR. BABASAHEB R. SANKAPAL Address of Applicant :DEPARTMENT OF PHYSICS, VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY (VNIT), NAGPUR -440010, MAHARASHTRA, INDIA. ----- 3)DR. MANOJKUMAR M. JADHAO Address of Applicant :INSTITUTE OF CHEMICAL TECHNOLOGY MUMBAI MARATHWADA CAMPUS, JALNA - 431213, MAHARASHTRA, INDIA. ----- 4)MR. NILESH DILIP JADHAV Address of Applicant :DEPARTMENT OF PHYSICS, G T PATIL ARTS COMMERCE AND SCIENCE COLLEGE NANDURBAR-425412, MAHARASHTRA, INDIA. ----- 5)MR. VISHAL V. LONIKAR Address of Applicant :DEPARTMENT OF PHYSICS, H.P.T. ARTS & R. Y. K. SCIENCE COLLEGE, NASHIK- 422005, MAHARASHTRA, INDIA. ----- 6)DR. SUPRIYA JOSHI Address of Applicant :INSTITUTE OF CHEMICAL TECHNOLOGY MUMBAI MARATHWADA CAMPUS, JALNA - 431213, MAHARASHTRA, INDIA. ----- 7)DR. VINOD S. KHAINAR Address of Applicant :DEPARTMENT OF PHYSICS, MET'S IOT, BKC, NASHIK, 422003, MAHARASHTRA, INDIA. ----- 8)DR. VISHAL GOKUL BELDAR Address of Applicant :DEPARTMENT OF PHARMACOGNOSY, SCHOOL OF PHARMACY & TECHNOLOGY MANAGEMENT, SVKM'S, NARSEE MONJEE INSTITUTE OF MANAGEMENT STUDIES (NMIMS) DEEMED-TO-BE-UNIVERSITY, SHIRPUR, 425405, MAHARASHTRA, INDIA. -----</p>
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(57) Abstract :

The present invention provides a one-step, in-situ green synthesis method for the functionalization of cotton fabric with silver nanoparticles (AgNPs) using banana peel extract as a natural reducing, stabilizing, and anchoring agent. The invention eliminates the need for separate nanoparticle synthesis and post-deposition processes by enabling the simultaneous formation and immobilization of AgNPs directly onto the cotton substrate in a single reaction environment. The process involves immersing the fabric in a reaction mixture comprising silver nitrate and banana peel extract under controlled temperature and time conditions, resulting in a uniform and durable nanoparticle coating. The method is eco-friendly, cost-effective, and scalable, with enhanced antimicrobial properties suitable for textile, biomedical, and hygienic applications. Multiple process embodiments are disclosed, including variations in silver nitrate concentration, extract preparation techniques, reaction parameters, and substrate types. The invention offers a sustainable alternative to conventional multi-step coating techniques with improved nanoparticle adhesion, wash durability, and antimicrobial efficacy.

No. of Pages : 23 No. of Claims : 6