

# Silk-Fibroin-Noble-Metal based Bionanocomposites as Ecofriendly Formulation with Antimicrobial and Potent *on-site* Zika Virus Vector Larvicidal Activities

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## Abstract

Dialyzed natural polymer (fibroin) derived from domesticated silk-worm species *Bombyx mori* has been explored to synthesize biocompatible silver and gold nanoparticles *in-situ* in dispersion form. The films of pure fibroin (PF), fibroin-silver nanocomposite (FSNC) and fibroin-gold nanocomposite (FGNC) were also fabricated by drop casting method. The dispersions of PF, FSNC and FGNC were tested for antibacterial activity against *E. coli* NCIM 2065, *S. aureus* NCIM 5021, *K. pneumoniae* NCIM 2957, *P. aeruginosa* ATCC 9027 and antifungal activity against *A. fumigates* NCIM 902. FSNC dispersion disclosed an effective antimicrobial action against all the chosen microbes as compared to FGNC dispersion. Additionally, the larvicidal activity of the films was investigated against the larvae of *Aedes aegypti*. The films of FSNC exhibited 100% mortality while the films of FGNC revealed 86 – 98% mortality against all the larval instars and pupae of *A. aegypti*. The phytotoxicity study of the nanocomposite films was also performed to confirm the reusability of water. This is the first green bio nanocomposite-based report on prominent larvicidal activity of zika virus vector.

## Biography



**Dinesh Amalnerkar** is currently Professor Emeritus at SP Pune University. Previously, he served as the Director General of Centre for Materials for Electronics Technology, Pune (CMET, Government of India) from February 2009 till his superannuation in November 2014. He has long-standing research experience in multi-institutional and multi-country settings. While placed at CMET, he held long-term visiting assignments in Gifu University, Japan & Korea Research Institute of Chemical Technology and short-term assignments in Singapore, Switzerland, Slovenia, Bulgaria, Japan and Saudi Arabia. More recently, he worked as Brain-Pool Invited Scientist at Sungkyunkwan University and Hanyang University, South Korea. His versatile research contributions in Functional Electronic & Nanostructured Materials and Nanobioscience include 240 peer-reviewed research papers, 24 Indian Patents, 3 US Patents, 1 Book Chapter and 3 Technology Transfers. He is an Elected Fellow of Maharashtra Academy of Sciences and Indian Chemical Society. He is recipient of the Materials Research Society of India's (MRSI)

prestigious Medal Award in the year 2008 for his significant contributions in Materials Science and Engineering. He has also received rare distinction of Honorary Fellowship of Indian Society of Analytical Scientists (ISAS) conferred upon him in Special Function held during Indian Analytical Science Congress (Feb. 2022).

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