

Nanostructured coatings and materials for aerospace applications: Current status, challenges and future prospects

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Abstract

There has been a lot of progress in the last decade or two in producing smaller/smarter devices with high performance. Nanostructured coatings and materials constitute a major area of scientific exploration and scientific pursuit in this development. Nanostructured materials, i.e., whose crystallites have dimensions of the order of a few nanometers, exhibit extremely fascinating and useful properties owing to their small grain size, and consequent large volume fraction of atoms in or near the grain boundaries. We, at CSIR-NAL, have developed a large number of nanostructured coatings, which include: Nanolayered/ nanocomposite coatings for tribological applications, supertough and solid lubricant coatings for high speed machining of difficult-to-machine materials, nanostructured coatings for renewable energy applications, nano-dimensional magnetic thin films for aerospace/engineering applications, superhydrophobic coatings for aerospace applications, carbon nanotubes and graphene for radar absorbing applications, transparent conductors for electronics and space applications, etc. My lecture will address some of the challenges in developing these coatings for aerospace sectors and will also present a glimpse of futuristic nano-inspired surface modification technologies, which will enable providing eco-friendly and cost effective solutions to the aerospace industry problems.

Brief Biodata of Dr. Harish C. Barshilia

Dr. Harish C. Barshilia obtained his M. Tech. and Ph. D. degrees in Physics from the Indian Institute of Technology, Delhi in 1993 and 1997, respectively. He was a postdoctoral fellow at the University of Missouri, St. Louis, USA and at the City University of New York, New York, USA during 1997-1999. He joined CSIR-National Aerospace Laboratories (NAL), Bangalore in 1999. Currently he is Chief Scientist and Head of Surface Engineering Division, CSIR-NAL, Bangalore. He is also the Professor at The Academy of Scientific and Innovation Research.



He has published 214 peer-reviewed papers in the internationally reputed journals, 32 papers in Conference Proceedings, 5 Book Chapters (including 2 in CRC Handbooks) and 4 comprehensive review articles. He has executed 42 sponsored/grant-in-aid projects and is the inventor of fifteen patents (including 11 international granted patents). He has contributed 110 papers in national and international conferences. Dr. Barshilia has delivered 123 invited lectures (including Plenary and Keynote) in India and abroad, and has guided several UG, PG, doctoral and postdoctoral students.

Dr. Barshilia was awarded Young Scientist Award in 2000 by CSIR, Dr. Ambasankaran Award in 2001 by Indian Vacuum Society, Outstanding Research Award in 2004 by CSIR-NAL, MRSI Medal by Materials Research Society of India in 2011. He is the elected fellow of The Indian National Academy of Engineering.

Dr. Harish Barshilia was the Vice-President (India), Thin Film Society, Singapore, from 2009-2014, Member, Management Council, CSIR-NAL, Life member of various professional societies such, Solar Energy Society of India, Material Research Society of India, Indian Vacuum Society, ISAMPE, Aeronautical Society of India, Indian Physics Association, etc.

Dr. Barshilia was also the Associate Editor of the journal "*Nanoscience and Nanotechnology Letters*", during 2013-2016. Presently, he is the Council Member of The Materials Research Society of India.