

Northumbria Research Link

Citation: Inam, Fawad and Okolo, Chichi (2016) Fullerenes for enhanced performance of novel nano-exploited aircraft materials. In: 14th Eurasia Conference on Chemical Sciences (EuAsC2S), 15th - 18th December 2016, Karachi, Pakistan.

URL: <http://eurasia14.org/> <<http://eurasia14.org/>>

This version was downloaded from Northumbria Research Link:
<http://nrl.northumbria.ac.uk/28940/>

Northumbria University has developed Northumbria Research Link (NRL) to enable users to access the University's research output. Copyright © and moral rights for items on NRL are retained by the individual author(s) and/or other copyright owners. Single copies of full items can be reproduced, displayed or performed, and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided the authors, title and full bibliographic details are given, as well as a hyperlink and/or URL to the original metadata page. The content must not be changed in any way. Full items must not be sold commercially in any format or medium without formal permission of the copyright holder. The full policy is available online: <http://nrl.northumbria.ac.uk/policies.html>

This document may differ from the final, published version of the research and has been made available online in accordance with publisher policies. To read and/or cite from the published version of the research, please visit the publisher's website (a subscription may be required.)

www.northumbria.ac.uk/nrl



CHEMISTRY FOR SUSTAINABLE AND INCLUSIVE DEVELOPMENT



(1966 - 2016)
Golden Jubilee
Decade of Excellence and Leadership in Sciences



14th EURASIA Conference on
Chemical Sciences



EuAsC₂S-14

14th EURASIA CONFERENCE ON CHEMICAL SCIENCES

December 15 - 18, 2016, Karachi, Pakistan

Abstracts

Jointly organized by:

Husein Ebrahim Jamal Research Institute of Chemistry,
(International Center for Chemical and Biological Sciences)
University of Karachi, Karachi-75270, Pakistan

and

Economic Cooperation Organization (ECO) Science Foundation (ECOSF)
Islamabad, Pakistan

Fullerenes for Enhanced Performance of Novel Nano-exploited Aircraft Materials

Fawad Inam, and Maureen Okolo

*Northumbria University, Department of Mechanical and Construction Engineering, Faculty of Engineering and Environment, Newcastle upon Tyne, NE1 8ST, United Kingdom;
Email: fawad.inam@northumbria.ac.uk*

Fullerene is an allotropic form of carbon having a large spheroidal molecule consisting of a hollow case of sixty or more carbon atoms. In the past decade, this family of super carbonaceous materials is subject of significant research interest for their utilization in an increasing number of applications including energy, transportation, defense, automotive, aerospace, sporting goods, and infrastructure sectors. Carbon nanotubes and graphene are some of the common types of fullerenes. This presentation will look into how a simple chemical manipulation at nano-scale of a superlattice chicken wire structure of graphene can be exploited to address major engineering challenges we are now encountering in the development of non-metallic reinforced plastic aircrafts like Airbus A350 and Boeing Dreamliner 787. Substituting metallic accessories, like Expanded Copper Foil (ECF) used for lightning strike protection, with graphene in the wings of carbon fiber reinforced polymer composites aircrafts is currently being extensively researched at industrial scale. This substitution offers good chemical compatibility with the base matrix material (epoxy) and can solve various existing issues. It would also offer other benefits, like in-situ structural health monitoring of aircraft components and improved mechanical properties and structural integrity as well. However, there are several challenges prior to this forthcoming substitution, as being dealt by leading aircraft manufacturers of Europe and USA, which will be discussed in detail.

Reference:

1. R. Atif et al., *J Nanotech*, 7, 1174-1196, 2016.
2. R. Atif et al., *Polymers*, 8, 281, 2016.
3. R. Atif et al., *Graphene*, 5, 96-142, 2016.
4. R. Atif et al., *RSC Adv.* 6, 1351-1359, 2016.