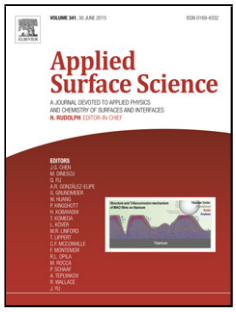

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PII: S0169-4332(16)32949-X
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.12.218
Reference: APSUSC 34765

To appear in: *APSUSC*

Received date: 7-9-2016
Accepted date: 27-12-2016

Please cite this article as: Andrea L.Woodhead, Mandy L.de Souza, Jeffrey S.Church, An investigation into the surface heterogeneity of nitric acid oxidized carbon fiber., Applied Surface Science http://dx.doi.org/10.1016/j.apsusc.2016.12.218

An investigation into the surface heterogeneity of nitric acid oxidized carbon fiber.

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Highlights

- A series of nitric acid treated CFs were produced to explore surface heterogeneity.
- Several surface analysis techniques, SEM, XPS, AFM and Raman, were compared.
- Raman spectral maps were used to explore chemical effects of the treatments on CF.
- These maps provided information at a spatial resolution unattainable by XPS.
- CFs subjected to the harshest treatment displayed increased surface heterogeneity.

ABSTRACT

The carbon fiber surface plays a critical role in the performance of carbon fiber composite materials and, thus it is important to have a thorough understanding of the fiber surface. A series of nitric acid treated intermediate modulus carbon fibers with increasing treatment level was prepared and characterized using a range of surface sensitive techniques including Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), X-ray Photoelectron Spectroscopy (XPS) and Raman spectroscopy. The results, which were found to be consistent with increasing treatment levels, were compared to the literature. Raman spectral mapping has been used to investigate the heterogeneity of the carbon fiber surface after nitric acid oxidation. The mapping enabled the effects of surface treatment on carbon fiber to be investigated at a spatial resolution unattainable by XPS and provided chemical structure information not provided by SEM or AFM. The highest level of treatment resulted in the most