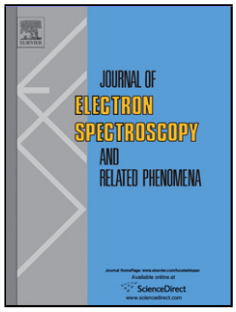

Title: Radiation damage yields across the carbon 1s excitation edge

Author: Adam F.G. Leontowich Adam P. Hitchcock Ray F. Egerton

PII: S0368-2048(15)00284-4
DOI: http://dx.doi.org/doi:10.1016/j.elspec.2015.11.010
Reference: ELSPEC 46524

To appear in: *Journal of Electron Spectroscopy and Related Phenomena*

Received date: 4-10-2015
Accepted date: 17-11-2015

Please cite this article as: A.F.G. Leontowich, A.P. Hitchcock, R.F. Egerton, Radiation damage yields across the carbon 1s excitation edge, *Journal of Electron Spectroscopy and Related Phenomena* (2015), http://dx.doi.org/10.1016/j.elspec.2015.11.010

Radiation damage yields across the carbon 1s excitation edge

Adam F.G. Leontowich[1‡*], Adam P. Hitchcock[1] and Ray F. Egerton[2]

1. Brockhouse Institute for Materials Research, McMaster University, Hamilton, L8S 4M1 Canada

2. Department of Physics, University of Alberta, Edmonton, T6G 2E1 Canada

ABSTRACT: X-rays are used as a probe in many materials analysis techniques, but they may induce changes in the sample that can invalidate the measurement. Strategies that overcome "radiation damage" are therefore desirable. Tuning the incident photon energy below a core electron excitation edge of a material (where only valence excitation takes place) rather than above it (where primarily core excitation occurs) has been theorized as a way to reduce radiation damage. To investigate this strategy, we used a scanning transmission x-ray microscope to expose thin films of organic polymers to x-rays with photon energies below and above the C 1s excitation edge. The extent of radiation damage was quantified by x-ray absorption spectroscopy and lithography. We found that the amount of radiation damage per unit absorbed dose was the same using incident photons below and above the C 1s excitation edge. We conclude that the turn on of Auger processes when C 1s holes are created does not affect the overall radiation damage outcome.

KEYWORDS: K edge effect, core edge effect, radiation damage, STXM, x-ray lithography.

‡Corresponding author: Tel: 1-306-657-3555, Email: adam.leontowich@lightsource.ca

*Present address: Canadian Light Source Inc., Saskatoon, S7N 2V3 Canada