
F. Schiller, M. Ruiz-Osés, J. E. Ortega, P. Segovia, J. Martínez-Blanco et al.

Citation: J. Chem. Phys. 128, 037101 (2008); doi: 10.1063/1.2813437
View online: http://dx.doi.org/10.1063/1.2813437
View Table of Contents: http://jcp.aip.org/resource/1/JCPSA6/v128/i3
Published by the American Institute of Physics.

Additional information on J. Chem. Phys.
Journal Homepage: http://jcp.aip.org/
Journal Information: http://jcp.aip.org/about/about_the_journal
Top downloads: http://jcp.aip.org/features/most_downloaded
Information for Authors: http://jcp.aip.org/authors

F. Schiller, M. Ruiz-Osés, and J. E. Ortega
Donostia International Physics Center, Paseo Manuel Lardizabal 4, E-20018 Donostia-San Sebastián, Spain, and Departamento de Física Aplicada I, Universidad del País Vasco, Plaza de Oñate 2, E-20018 Donostia-San Sebastián, Spain, and Centro Mixto CSIC/UPV, Universidad del País Vasco, Plaza de Oñate 2, E-20018 Donostia-San Sebastián, Spain

P. Segovia and J. Martínez-Blanco
Departamento de Física de la Materia Condensada, Universidad Autónoma de Madrid, E-28049 Madrid, Spain and Instituto Universitario de Ciencia de Materiales “Nicolás Cabrera,” Universidad Autónoma de Madrid, E-28049 Madrid, Spain

B. P. Boyle
Laboratorio Nazionale TASC, INFM-CNR, ss.14, km 163.5, Area Science Park, Basovizza, I-34012 Trieste, Italy

V. Pérez-Dieste and J. Lobo
Swiss Light Source, Paul Scherrer Institut, CH-5232 Villigen, Switzerland

N. Néel, R. Berndt, and J. Kröger
Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, D-24098 Kiel, Germany

(Received 10 August 2007; accepted 24 October 2007; published online 15 January 2008)

Schiessling and Brühwiler$^1$ question the validity of the results by Schiller et al.$^2$ and suggested that the throughput correction and the Fermi level placement are erroneous. Below, we rule out both scenarios.

First, potential intensity variations due to first and second order lights were taken into account by measuring the total yield absorption on gold samples close to the carbon K edge. Figure 1 shows the results of these measurements. Intensity variations due to second order light are negligible. In a next step, by measuring together with the sample the absorption on a W mesh small photon energy changes due to possible variations of the electron orbit in the synchrotron ring were corrected when necessary. Finally, spectra of C$_{60}$-covered Au samples were divided by spectra of clean Au surfaces acquired prior to C$_{60}$ deposition to correct for the beamline throughput function. In particular, they are not affected by second order light. Additionally, a linear background matching the low energy side of the spectrum was removed. Using different slopes of the subtracted linear background did not affect the spectra in the energy region of interest but became significant when extrapolated by 10 eV to the higher energy region of the spectra. The low intensity of spectra around 294 eV in Ref. 2 is due to a small inaccuracy in choosing this slope. As a consequence, the standard normalization procedure$^3$ used does not introduce new spectral features around the Fermi level.

The second remark by Schiessling and Brühwiler$^1$ concerns the position of the Fermi level. In the 0.5 ML C$_{60}$ near-edge x-ray absorption fine structure (NEXAFS) spectra the first peak is interpreted as the signature of the C$_{60}$ lowest unoccupied molecular orbital (LUMO).$^2$ Scanning tunneling spectroscopy reveals that the LUMO is placed roughly 1 eV above the Fermi level. Therefore, we conclude that the Fermi energy does not coincide with the carbon 1s binding energy as proposed by Schiessling and Brühwiler$^1$ X-ray absorption data in thin C$_{60}$ films are influenced by excitonic effects as previously reported by, e.g., Schwedhelm et al.$^4$ This work is consistent with our conclusion that the Fermi level is located 0.8 eV below the LUMO peak for the C$_{60}$ monolayer. The fact that the C 1s energy is higher than the gap state peak in NEXAFS may simply indicate that the core-hole at the C atoms in contact with the Au substrate at cluster edges, which gives rise to such a feature, is not completely screened by the metal electrons. Our new experiments at a different beam line confirm the presence of the Fermi level peak at submonolayer coverages.$^5$

FIG. 1. (Color online) Normalized total yield absorption on the gold sample measured at the BEAR-beamline of Elettra close to the carbon K edge (bottom) and on a gold mesh at double the photon energy range (top), respectively. In the present setup the second order light amounts to 0.2%.
In conclusion, the scientific contents of Ref. 2 remain unaltered.