

Accepted Manuscript

Modelling the contribution of semi-core electrons to the dielectric function

Maarten Vos, Pedro L. Grande

PII: S0022-3697(18)31841-9

DOI: [10.1016/j.jpcs.2018.09.020](https://doi.org/10.1016/j.jpcs.2018.09.020)

Reference: PCS 8733

To appear in: *Journal of Physics and Chemistry of Solids*

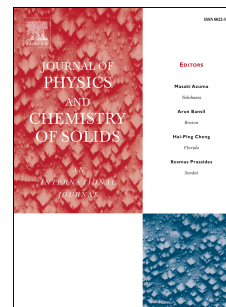
Received Date: 11 July 2018

Revised Date: 11 September 2018

Accepted Date: 14 September 2018

Please cite this article as: M. Vos, P.L. Grande, Modelling the contribution of semi-core electrons to the dielectric function, *Journal of Physics and Chemistry of Solids* (2018), doi: <https://doi.org/10.1016/j.jpcs.2018.09.020>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Modelling the contribution of semi-core electrons to the dielectric function

Maarten Vos

Electronics Materials Engineering, Research School of Physics and Engineering, The Australian National University, Canberra, 0200, Australia

Pedro L. Grande

Ion Implantation Laboratory, Institute of Physics, Federal University of Rio Grande do Sul, Av. Bento Gonçalves 9500, CP 15051, CEP 91501-970, Porto Alegre, RS, Brazil

Abstract

Many aspects of the interaction of charged particles with matter can be expressed in terms of the dielectric function $\epsilon(q, \omega)$. The dielectric function is relatively well known in the optical limit ($q = 0$) but, for example, stopping power calculations require the knowledge of the dielectric function for $q \neq 0$. Several approaches have been used to extend the dielectric function to $q \neq 0$ for both the valence electrons, using variations of the Lindhard dielectric function and the core levels where an atomic description can be used. The intermediate case of shallow core levels is somewhat problematic. Here collective effects modify the atomic picture, and the hydrogenic approximation of the wave function is less accurate. In this paper we describe a new extension scheme of the contribution to the energy loss function of shallow core levels to $q \neq 0$ and show that for Al and Si it describes the experimental stopping data somewhat better than previous approaches. It also describes reasonably well the proton and electron induced ionisation cross section of these

Download English Version:

<https://daneshyari.com/en/article/11031101>

Download Persian Version:

<https://daneshyari.com/article/11031101>

[Daneshyari.com](https://daneshyari.com)