

## Maria Carmen ASENSIO

Maria-Carmen Asensio, currently permanent scientist staff at “Synchrotron SOLEIL”, one of the French TGR (Très Grandes Infrastructures de Recherche) and partner of the Université Paris Saclay. She is also Professor of investigation (on leave) at the Institute of Materials Science of Madrid (CSIC).

Scientific production: 304 international journals, 2 book chapters, 80 invited lectures

Factor H: 36 and i10-index: 99 (Google scholar),

Citations more than 5670

Co-supervision of doctoral students: 11 theses supported.

### Formation and position:

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|-----------------------------------------------------------------------|-----------|
| • PhD from La Plata University, INIFTA (Argentina)                    | 1981-1986 |
| • Post-Doc, Universidad Autonoma de Madrid (Spain)                    | 1986-1987 |
| • Assistant Professor, Universidad Autonoma de Madrid (Spain)         | 1988-1989 |
| • Post-Doc, University of Warwick (United Kingdom)                    | 1989-1990 |
| • Non-permanent position, Materials Sciences Institute of Madrid-CSIC | 1991-1992 |
| • Permanent Position at the Material Sciences of Madrid - CSIC        | 1992-2006 |
| • LURE Staff (attached)                                               | 1991-2004 |
| • Professor at the Materials Sciences Institute of Madrid-CSIC        | 2006-2007 |
| • Synchrotron SOLEIL                                                  | 2007-     |

### Research activities:

Currently, Permanent Research Staff of the SOLEIL French synchrotron source and the Université Paris-Saclay, Professor Maria Asensio is also Permanent staff (on leave) at the Institute of Material Science of Madrid, in Spain working in the area of electronic structure determination by using low energy Synchrotron radiation. Maria Asensio commenced her academic career in Argentina, where after completing her Bsc degree in Physical Chemistry, she finished her PhD degree in Surface Science. Then she held a two-year Senior Lecturer in Physics at the Autonomous University of Madrid, followed by a two-year post-doctoral position at the University of Warwick in England, staying also at the Fritz Haber Institute of the Max-Planck in Berlin, Germany. She has collaborated in several large European Research Projects. She was elected Scientific Director of the IUVESTA ‘International Union for Vacuum Science, Technique and Applications’ until 2007. Presently she is chair of Surface Science Division of IUVESTA.

Asensio’s research comprises studying the application of a wide-ranged conventional and Synchrotron Radiation Based techniques devoted to the characterization of advanced materials, in the area of Solid State Physics. In particular, she has been currently performing studies on structural and Electronic properties of surfaces, interfaces and complex heterogeneous advanced materials by using angle resolved photoemission spectroscopy (ARUPS), photoelectron diffraction and x-ray absorption among others techniques. In particular, she has focused on the determination of the Fermi surface topology and electronic band structure of interfaces and massive materials; those that frequently present electronic instabilities due to low dimensional effects. Lately, she has conceived an innovative chemical and electronic imaging technique combining angle resolved photoemission and nano-microscopy, named “k-space nanoscope or NanoARPES”. The ensemble of her publications holds more than 5000 cites detailed in the Citation Index, including her last article on electronic structure of “silicene” (Phys. Rev. Lett. 2012) has been cited more than 1750 times.

### Major research grants awarded:

**2017-2018 : PHC PROCORE 2017** between France and Hong-Kong. “Exploring The Electronic Structure Of Monolayer Transition Metal Dichalcogenides”. Grant 30 k€

**2015 : PHC Programme XU GUANGQI**, between France and Chine, “Exploring the electronic structure of monolayer transition metal dichalcogenides”. Grant 20 k€

**2014-2016 : Croatian Science Foundation** “Periodically strained graphene; structural and electronic properties”. Grant 30k€

**2010-2012: ANR French.** “Graphene growth and interactions between the substrate and graphene layers” Grant 4 K€;

**2010-2012: French Korean PHC STAR** Code Project: 25852XH. “Free-standing single atomic plane of MoS<sub>2</sub>: An electronic structure study using synchrotron radiation based techniques” Project grant: 5 K€

**2008-2012: National strategic French synchrotron radiation programme**, Antares Beamline construction at SOLEIL 10 M€

**2017-2021: ANR French.** “Caractérisations avancées in situ operando de micro-batteries 3D tout solide à ions lithium développées en couche mince par ALD” Grant 680 K€.

**2017-2021: ANR French.** “Germanene on band gap materials” Grant 500 K€.

## **Education and training:**

- MCA has supervised 11 Doctoral Thesis, 8 among them on ARPES of low-dimensional systems. The last 4 have been awarded the European Label. One has been initiated this year.
- MCA has supervised of 22 Post-Doctorates works supported by CNRS (1), Marie Curie Fellowship of the European Community (4), biannual scholarships from the Spanish Ministry of Education (4) and 3 postdoctoral fellowships the International Centre of French Students and Trainees (CIES), (2) by TOTAL research Lyon and (8) by SOLEIL.

## **Thesis list:**

11.- **Title: Exploring Synthèse et propriétés physiques de couches de graphène élaborées par ablation laser pulsé. Caractérisations sur Grans Instrument (Synchrotron SOLEIL). (Thesis)**

**Author:** BLEU, Yannick Mexon., **Advisor:** Donnet, Christophe (dir) and Asensio, M.C. (co-dir.)

**Entity:** Laboratoire Hubert Curien, Université Jean Monnet Saint-Etienne and Synchrotron SOLEIL **Date:** to be determined.

10.- **Title: Exploring electronic structure of Germanium Quantum dots on Silicon substrate. (Master Thesis)**

**Author:** THAM, Jia Ying. , **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Multiple Degree Master Thesis in Chemistry for Erasmus Mundus International SERP-Chem Master. Presented at the University of Paris-Sud, following the courses at the University of Genova, University of Porto and University Adam Mickiewicz. **Date:** 2014-06-30

9.- **Title: Estructura electrónica, superficie de Fermi y ondas de densidad de carga en los óxidos de baja dimensionalidad  $n\text{-Mo}_4\text{O}_{11}$  y  $\text{KMo}_6\text{O}_{17}$ . (Thesis)**

**Author:** Valbuena Martínez, Miguel Ángel., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 2006-06-23

8.- **Title: Electronic structure and charge ordering in  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  and  $\text{Bi}_2\text{Sr}_2\text{CuO}_{6+\delta}$  superconductors. (Thesis)**

**Author:** Izquierdo Fernández, Manuel., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 2003-10-01

7.- **Title: Determinación de la estructura electrónica de materiales de baja dimensionalidad a partir de su superficie de Fermi. (Thesis)**

**Author:** Roca Pereda, Lydia., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 2003-04-25

6.- **Title: Evolución de la estructura electrónica y superficie de Fermi de interfases Ag/Si (111) en función de la cantidad de plata depositada. (Thesis)**

**Author:** Pérez Dieste, Virginia G., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 2002-11-15

5.- **Title: Pasivación de superficies semiconductoras y su influencia en las interfases metal-semiconductor. (Thesis)**

**Author:** Martín Fernández, Marta G., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 2001-07-10

4.- **Title: Determinación estructural de sistemas adsorbidos sobre substratos semiconductores mediante la difracción de fotoelectrones. (Thesis)**

**Author:** Franco Cerame, Nicolás., **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 1998-02-20

3.- **Title: Electron spectroscopy of layered structures based on lanthanum and carbón, ", specialization "physics of condensed mater". (Thesis)**

**Author:** Vyatkin, Andrei Gennadievich., **Advisor:** Adamchuk (dir.), Vera K. and Asensio Ariño, M.C. (co-dir.)

**Entity:** Saint Petersburg State University, Russian. & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.). The work is performed in the department of solid state electronics of scientific research institute of Saint-Petersburg state university and in laboratory LURE at synchrotron storage ring Super-Aco (Orsay, France) in group of Prof. . M.-C. Asensio. **Date:** 13.06.1996

2.- **Title: Determinación experimental de la estructura electrónica y la superficie de Fermi de multicapas magnéticas. (Thesis)**

**Author:** Casado Caballo, Constantino, **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Complutense de Madrid. Facultad de Ciencias Físicas. Departamento de Física de Materiales & (C.S.I.C.)

**Date:** 1996

1.- **Title: Determinación estructural de superficies por medio de difracción de fotoelectrones. (Thesis)**

**Author:** Dávila Benítez, María Eugenia, **Advisor:** Asensio Ariño, M.C. (dir.)

**Entity:** Universidad Autónoma de Madrid (UAM). Departamento de Física de la Materia Condensada & Instituto de Ciencias de Materiales de Madrid (C.S.I.C.) **Date:** 1996-05-24

### **Main Responsibilities and awards:**

- MCA has been appointed as chairperson of several international conferences and workshops
- MCA was appointed as a member of the Board of Directors of AFV, a non-profit association for the teaching of science and technology (<http://www.vide.org/>)
- MCA was appointed as Scientific Director of the IUVSTA for a three-year period (2004-2007). The IUVSTA is an International Federation of thirty national vacuum organizations. It represents nearly 15,000 physicists, chemists, materials specialists, engineers and technologists who are active in basic and applied research, development, manufacturing and education, (<http://iuvsta-us.org/iuvsta2/index.php>) .
- MCA was appointed as Chair of the Surface Science Section in the IUVSTA for a three-year period (2016-2019).
- MCA was named "Section Editor for Computational and Experimental Methods". This appointment by Journal of Physics: Condensed Matter, IOP Publishing will last three years, from January 2017 to December 2019.
- MCA was appointed as stable member of the Editorial Board of the Physics and Chemistry of Solids Journal. This appointment by the Journal of Physics: Condensed Matter, IOP Publishing is valid for an indefinite period.
- MCA has been appointed a stable member of the VASSCAA International Steering Committee (ISC). This appointment will last three years from September 2016. The VASSCAA conference series is organized to create a forum in Asia and Australia to discuss surface and related sciences, Techniques and applications.
- MCA was appointed as a stable member of the program committee of the European Conference on Surface Science (ECOSS) "Physics and Chemistry of Solids Journal." This appointment will last three years, from September 2016.
- MCA was appointed as a stable member of the 15th European Vacuum Conference Program Committee (EVC15) to be held from 7 to 22 June 2018, Geneva, Switzerland.

### **Significant publications:**

1. Chen, C., Avila, J., Frantzeskakis, E., Levy, A., Asensio, M.C., Observation of a two-dimensional liquid of Fröhlich polarons at the bare SrTiO<sub>3</sub> surface. **Nature Communications** **6**, 8585 (2015) doi: **10.1038/ncomms9585**
2. Pierucci, D., Henck, H., Avila, J., Balan, A., Naylor, C. H., Patriarche, G., Dappe, Y. J., Silly, M. G., Sirotti, F., Johnson, A. T. C., Asensio, M. C. and Ouerghi, A. Band alignment and minigaps in monolayer MoS<sub>2</sub>-graphene van der Waals heterostructures. **Nano Letters**, **2016**, **16** (7): 4054–4061
3. Razado-Colambo, I., Avila, J., Nys, J. P., Chen, C., Wallart, X., Asensio, M. C. and Vignaud, D. NanoARPES of twisted bilayer graphene on SiC: absence of velocity renormalization for small angles. **Scientific Reports**, **6**, 27261 (2016)
4. C. Bao, W. Yao, E. Wang, C. Chen, J. Avila, M. C. Asensio, S. Zhou, 2017. Stacking-Dependent Electronic Structure of Trilayer Graphene Resolved by Nanospot Angle-Resolved Photoemission Spectroscopy, **Nano Letters** **17**, 1564–1568, (2016) doi:10.1021/acs.nanolett.6b04698
5. Ma, Y., Diaz, H.C., Avila, J., Chen, C., Kalappattil, V., Das, R., Phan, M.-H., Čadež, T., Carmelo, J.M.P., Asensio, M.C., Batzill, M., Angle resolved photoemission spectroscopy reveals spin charge separation in metallic MoSe<sub>2</sub> grain boundary. **Nature Communications** **8**, 14231 (2017), doi:10.1038/ncomms14231