Institut Català de Nanociència i Nanotecnologia

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Cerdanyola del Vallès, 5th November 2014

Ref: Support for Surface Diffraction Beamline at ALBA

To whom it may concern:

As Director of the **Catalan Institute of Nanoscience and Nanotechnology (ICN2),** I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

ICN2 is a private foundation with the objective of becoming a world-renowned centre for nanoscience and nanotechnology research.

ICN2's research lines focus on the newly discovered physical and chemical properties that arise from the fascinating behaviour of matter at the nanoscale.

Much of our work is devoted to studying and understanding fundamental physical phenomena associated to state variables as regards electrons, phonons, photons, plasmons, etc.; investigating new properties derived from tailored nanostructures; and establishing new processes for the conception and fabrication of new nanodevices.

This work enables functionalisation of nanoparticles, encapsulation of active agents and creation of new nanodevices and nanosensors, through frontier science that has direct implications for various sectors (health, food, energy, the environment, etc.).

Recognising that nanotechnology is an interdisciplinary area, the Institute actively promotes collaboration among scientists from diverse backgrounds (physics, chemistry, biology, engineering), seeking to integrate their knowledge to complete its mission.

Having in mind the global research objectives of ICN2, the multipurpose diffraction beamline proposed for ALBA would constitute an excellent and relevant complementary tool to those that our Institue already has, and it would help to unravel and to better understand the behavior of numerous interesting phenomena in very different systems that are being studied by the ICN2 research Groups.

The open configuration of the diffractometer offers to the users the sufficient flexibility to design their own experiment while ensuring a minimum level of guarantees due to the prevision of an UHV surface preparation laboratory and the possibility to perform experiments under different environmental conditions.

Our Institute has already experience collaborating with ALBA staff, in particular with the BOREAS beamline, by means of a collaborative project developed to adapt a STM equipment to permit the possibility to combine absorption measurements with scanning probes.

ICN2, consequently, strongly supports the project of a surface diffraction beamline proposed for the ALBA synchrotron facility.

Yours sincerely,

Prof. Pablo Ordejón, Director ICN2

Cerdanyola del Vallès, 6th November 2014

To whom it may concern

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

The **Institute of Materials Science of Barcelona (ICMAB) is a research institute of the Consejo Superior de Investigaciones Científicas (CSIC)**, the largest research organization of Spain focusing on basic and applied research. The ICMAB, which is already more than two decades old that at present includes about 220 people with 54 scientists as permanent staff. The initial and ongoing mission of the ICMAB is "to generate new knowledge in Materials Science and transfer it to the society, particularly to industry within the European Research Area". Materials Science has evolved dramatically in the last 20 years and the cutting edge activities in this area are now deeply rooted in the Nanoscience revolution.

ICMAB's research lines focus on the newly discovered physical and chemical properties that arise from the fascinating behaviour of matter at the nanoscale. The different types of materials currently be developed by our research Groups can be classified in 3 groups:

Materials for information science and electronics

- Nanostructured magnetic materials and novel functional oxides
- Semiconductors and molecular materials with electronic, optoelectronic and magnetic functionalities

Materials for energy and environment

- Superconducting materials and electrical power applications
- Chemically and electrochemically generated materials for energy harvesting, storage, fuel use, sensing and catalysis

Biomaterials for drug delivery, therapy, diagnostics and sensing
Methodologies for materials science and nanotechnology

- Theory, simulation and modeling of materials and properties at the nanoscale
- Bottom-up strategies for assembling and preparation of functional molecular and/or inorganic (nano)materials
- Scattering and microscopy methodologies for advanced materials investigation

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Recognising that nanotechnology is an interdisciplinary area, the Institute actively promotes collaboration among scientists from diverse backgrounds (physics, chemistry, biology, engineering), seeking to integrate their knowledge to complete its mission.

Having in mind the global research objectives of ICMAB, the multipurpose diffraction beamline proposed for ALBA would constitute an excellent and relevant complementary tool to those of our Institue already has, that would help to unravel and to better understand the behavior of numerous interesting phenomena in the large number of different systems that are being studied by the components of the ICMAB research Groups.

The open configuration of the diffractometer offers the sufficient flexibility to the users to design their own experiment while offering a minimum level of guarantees due to the prevision of an UHV surface preparation laboratory and the possibility to perform experiments under different environmental conditions.
Our Institute has a rather large number of experienced researchers that use the specific capabilities offered by large synchrotron and neutron facilities as a routine more. At the present several of these researches are the promoters of this project.

Our Institute, consequently, strongly support the project of surface diffraction beamline proposed for ALBA synchrotron facility.

Yours faithfully

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
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Prof. Xavier Obradors Berenguer
ICMAB Director

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Valencia, 5th November 2014

Dear Madam/Sir,

Prof. Jose Manuel Serra Alfaro and Prof. Fernando Rey García are currently focused in some of the research lines that are being developed at the ITQ (Institute of Chemical Technology (CSIC-UPV in Valencia). These lines include the synthesis and characterization of organic and inorganic micro and mesoporous materials with application in catalysis, adsorption and nanotechnology; advanced applications for materials in energy conversion such as fuel cells, electrolyzer, gas separation membranes, etc. Being one of the final goals the technology transfer to industry

The preparation of these materials accomplishes the use of discontinuous reactors for hydrothermal synthesis, chemical vapor deposition techniques or high-throughput robotic systems for synthesis of multiple materials.
In this frame, the structural characterization of these materials include the use of several conventional techniques available at our Institute, i.e. X-rays diffraction, electron microscopy and diffraction, while further characterization includes gas adsorption analyzers, thermogravimetry or programmed thermal desorption among others. Surface chemistry characterization of the prepared catalysts is of paramount relevance in our research and we account with the X-Ray photoelectron and Auger spectroscopies at our laboratory.

Also, the accurate structural knowledge of our materials is obtained using advanced synchrotron radiation techniques as high resolution x-ray powder diffraction under operation conditions. Moreover, the understanding of the catalytic processes taking place in our systems under reaction conditions at high gas pressures and temperatures make the design of special reaction chambers for being adapted to the geometry of several experimental beamlines as that developed for the Powder Diffraction endstation of ALBA, i.e. the so called ICP-ITQ-ICIQ capillary flow cell for capillary samples (RT- 750ºC) and Pressure (maximum pressure 15 bar) or the in-situ cells for XAS experiments, achieving similar temperature and pressure than above.

An emergin research area in our Institute includes the development of new fuel cells and membrane reactors, where the electrocatalysis is a surface phenomenon involving, very probably, relevant structural changes in the topmost surface membrane layers. For this reason a flow reactor chamber for studying under in-situ conditions the structural and morphological changes induced on the surface of these compounds during reaction is highly desired. Then the implementation of an in-situ cell, like that proposed in the surface diffraction beamline ALBA project, would permits to gain access to wide (GIXRD) and small (GISAXS) angle diffraction techniques and therefore will allow the understanding of the surface mechanisms having place during the reaction as well as to go forward in the surface modeling of these processes.

We believe these new characterization synchrotron possibilities are extremely complementary with the general advanced research tools we are already using. This would permit to focus our

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studies to the region of interest where the catalytic processes are more relevant, i.e. the surface. For this reason, We give our strong support to this project since it is an ideal tool for the study of our new types of catalysts and advanced materials that are already being developed in our Instituto.

Yours faithfully,

Prof. Fernando Rey
Prof. Investigación del CSIC

Prof. José Manuel Serra
Prof. Investigación del CSIC

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ICMAB
INSTITUT DE CIÈNCIA
DE MATERIALS DE
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Cerdanyola del Vallès, 5th November 2014

Dear Madam/Sir,

Prof. Jaume Veciana is head of the Group NANOMOL (Molecular Nanoscience and Organic Materials) at the Research Institute of Materials Science of Barcelona (ICMAB-CSIC) that expands is research activity in different areas of the molecular chemistry and synthesis, i.e. molecular magnetism, molecular electronics, large area electronics, supercritical fluids as synthesis process, nanomedicine and biomaterials.

Our Group has extensive experience in the development of smart materials for application in different technological areas of interest as molecular electronics, nanomedicine and magnetism. In fact NANOMOL is highly involved in the field of large area organic electronics (OLAE) which is raising great interest due to the potential that organic materials offer to fabricate low-cost and flexible devices. We are engrossed not only in gaining an insight into fundamental aspects that take place in these materials, but also with the view of developing novel practical devices. In particular, we are currently engaged in the development of organic field-effect transistors (OFETs) and organic strain sensors. These molecular systems involve a high degree of lateral order making them good candidates to enlarge the knowledge we already have on them on aspects related with their 2-dimensional structure, i.e., interlayer ordering, interaction with the substrate, thin film and/or single layer structure. The grazing incidence diffraction beamline project proposed for ALBA will allow not only a better understanding of the structure and assembly of the molecular materials of interest but also to follow in-situ the growth nucleation process using grazing incidence small angle diffraction techniques. This last technique could also be used be to obtain information on the size and internal average distribution of therapeutic actives encapsulated in nanoparticulate materials.

The possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms. Moreover, resonance can also be used to determine the role and degree of involvement of a particular specimen in the surface or interface structure.

Our group strongly support the project of surface diffraction beamline proposed for ALBA. This beamline will offer different diffraction techniques susceptible to provide useful information on several aspects of our systems of interests, going from the initial nucleation process to the analysis of the film structure.

Yours faithfully

Prof. Jaume Veciana

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Zaragoza, 5^{th} November 2014

Dear Madam/Sir,

Dr. Javier Blasco Carral (senior researcher) and Dra. María Gloria Subías Peruga (tenured scientist) belong to CAMRADS (Characterization of Materials using Synchrotron Radiation Techniques) research group which is included in the Magnetic Materials Department of the Aragón Material Science Institute (ICMA), Joint Center from the Spanish National Research Council (CSIC) and the University of Zaragoza (UZ). This Department covers research areas in a great variety of magnetic materials as well as the magnetism of systems at different size scales. Starting with the study of local atomic properties and having means to synthesize and produce molecules, nanostructures, micro structures and macroscopic systems. Moreover, applied research and technology transfer is also pursued.

Magnetic materials with potential technological interest are of interest not only to our Department but also to our Group. Thus, the relationship between macroscopic and microscopic properties of functional and size controlled magnetic materials, starting at the nano scale level, the correlation between macroscopic physical properties and the microscopic electronic structure of mixed oxides, quantum and collective phenomena at low temperatures on magnets with different size scales are investigated. Expertise on the use of large scale facilities, as Synchrotron Radiation and Neutron Diffraction, and on the development of theoretical and advanced instrumentation tools for basic and industrial research, allows ambitious goals to be fulfilled.

Our research (CAMRADS) is more specifically devoted to the study of strongly correlated mixed transition metal and rare earth oxides. We are interested in materials exhibiting abrupt changes in their electrical and / or magnetic properties as function of an external variable (temperature, pressure, composition) for trying to correlate these changes with the structural and electronic ones (crystallographic phase transitions, interatomic distances, angles liaison, electronic anisotropy, etc.). The goal of this correlation between structural and electronic change and the corresponding change in a physical property is to understand the mechanism underlying the transition or property. This understanding will allow in the future the development of new types of tailored materials. We also study oxides exhibiting unique properties such as metal-insulator transitions with modulated charges, giant magnetoresistance (metal-insulator transition coupled to a magnetic field) and we recently researching new multiferroic materials where magnetic and electric order coexist seeking new ways of magnetoelectric coupling. These studies include different tasks such as synthesis of materials, analysis, structural determination and characterization of their physical properties. Within this wide range, our group specializes in the use of large international facilities with particular relevance of techniques using synchrotron radiation to characterize not only the crystal structure of the materials but also the local structure of its components. We usually perform x-ray diffraction measurements (non-resonant and resonant), x-ray absorption spectroscopy (EXAFS, XANES, XCMD) and x-ray emission spectroscopy (XES) and we are a worldwide reference on the use of the resonant x-ray scattering technique (RXS).

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For this reason a project as the SIRENA beam line for ALBA offering the possibility of tuning the photon energy would allow us to carry out experiments at energies across the absorption edge of a particular element. This is of special relevance to investigate not only surface magnetism but also for the study of charge and / or orbital ordered phases and magnetic diffraction in bulk single crystals, where no other experimental technique can match the amount of information RXS provides. Moreover, the joint analysis of the incoming-scattered light polarization correlation allows us to reconstruct in detail the spatial anisotropic distribution of the electronic density of states.

We strongly support the project of the surface diffraction beam line for ALBA since it offers the technical requirements needed to apply the RXS technique to the mentioned research areas that are in the focus of our scientific interests.

Yours faithfully,

Dra. María Gloria Subías Peruga
Tenured Scientist ICMA

Dr. Javier Blasco Carral
Senior Researcher ICMA

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Institut Català de Nanociència i Nanotecnologia

Bellaterra, 5th November 2014

Dr. José Santiso
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To whom it may concern:

It is my pleasure to express my support to the “SIRENA” ALBA Beamline proposal being submitted by Xavier Torrelles

In the Nanomaterials Growth Division at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), which I’m leading, we carry out collaborative research in the field of Thin Film and multilayer Deposition and Characterization of Nanomaterials. Our research areas are devoted to complex oxide materials deposited by means of pulsed laser deposition (PLD) technique monitored by reflection high energy electron diffraction (RHEED). We explore th**e interplay between strain relaxation phenomena and functional properties in complex oxide films,** as well as surface and interfacial ionic exchange phenomena. This research field involves the development of novel methods for the X-ray diffraction and diffuse scattering characterisation of microstructure features in epitaxial thin films. These included in-plane diffraction, GISAXS analysis, as well as 3D reciprocal space mapping (this last type of analysis required the use of synchrotron radiation source, i.e. BM25-ESRF and KMC2-Bessy).

Synchrotron grazing diffraction techniques offer the possibility to fully characterize the structure of a thin film by measuring the intrinsic diffraction rods in case of incommensurate films or the crystal truncation rods having mixed information from the film and substrate. This last case is of special interest to get information on the chemical composition at the interface between both as well as the relaxation behaviour of atoms located in this region that can be related with the conducting phenomena at oxide interfaces.

The possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements that could show an effective magnetic moment. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms.

I hereby express my support for the multipurpose X-ray diffraction beamline (SIRENA) at ALBA synchrotron facility. This beamline will offer different diffraction techniques susceptible to provide useful information on several aspects of our systems of interests, i.e. film structure determination, surface morphology, interface ordering/disordering, chemical composition along the film, film texture information, magnetic anisotropies, kinetic of surface redox reactions.

Yours faithfully

Dr. José Santiso

Institut Català de Nanociència i Nanotecnologia

Gustau Catalan
ICREA Research Professor
Head of the Oxide Nanoelectronics Group
ICN2-Institut Catala de Nanociencia i Nanotecnologia, Campus UAB, Barcelona

To whom it may concern:

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

In the Oxide Nanoelectronics Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), which I am leading, we aim to explore the emerging phenomena of electronic oxides at the nanoscale. The group is presently focusing on two areas, Nanodomains & Domain Walls and Strain & Strain Gradients, related to two main groups of materials: ferroelectrics/multiferroics and oxides with metal-insulator transitions. Researchers in the Oxide Nanoelectronics Group use the techniques suchs as atomic force microscopy (AFM), impedance and dynamic mechanical analysis, and high resolution X-ray diffraction (XRD). We have often had to travel to ESRF in Grenoble, DESY in Hamburg in order to perform grazing-incidence diffraction experiments and have produced well cited articles based on our results there (see, for example, Catalan et al Nature Materials 2011, Marti et al Physical Review Letters 2011).

The electronic properties of oxide films change dramatically as their thickness approaches the nanoscale. These size effects pose technological challenges for translating the properties of electroceramics to small devices, but also lead to new opportunities. Synchrotron grazing diffraction techniques offer the possibility to fully characterize the structure of a thin film as well as chemical composition at the interface and the relaxation behaviour of atoms located in this region. The mismatch between film and substrate can be easily quantified together with its evolution with depth, giving information on strain gradients, which is one of the core areas of activity in my group (we have an ERC grant to study flexoelectricity, which is a coupling between strain gradient and polarization). Thin film diffraction also represents the only non-destructive technique for measuring domains in the sub-10nm size range, where even atomic force microscopes cannot probe (see Catalan et al PRL 2006); knowledge and control of domain structure is a fundamental aspect of the emergent area of “domain wall nanoelectronics” in which my group is also very active.

Finally, the possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements that could show an effective magnetic moment. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms. This allows characterizing antiferromagnetic ultra-thin films, a problem which is notoriously difficult by any other technique. It is worth bearing in mind that antiferromagnetism is also coupled with other functional properties such as magnetoelectricity (e.g. $BiFeO_3$) or metal-insulator transitions

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(e.g. $NdNiO_3$). I am not aware of any other line in Europe combining resonant scattering with grazing incidence, so this would be a strong unique selling point for ALBA.

We therefore strongly support the project of surface diffraction beamline proposed for ALBA synchrotron facility.

Yours faithfully

Prof. Gustau Catalan, Bellaterra, 05/11/2014

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EXCELENCIA SEVERO OCHOA

Cerdanyola del Vallès, 5th November 2014

To whom it may concern:

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

The Magnetic Nanostructures Group at the ICN2- Institut Catala de Nanociencia i Nanotecnologia, which I am leading, investigates different types of magnetic nanostructures with the aim of improving their functional properties. The group combines state of the art lithographic or chemical synthesis methods with structural, morphological and magnetic characterization to focus on three areas; magnetic properties of lithographed magnetic nanostructures, magnetic nanoparticles, and other non-nanometric systems. Magnetic lithographed nanostructures are at the heart of most spintronic devices. Similarly, magnetic nanoparticles have demonstrated a potential in a broad range of disciplines, from medical applications to magnetic recording. At the same time, these types of systems exhibit a variety of novel properties which have not been exploited in applications.

Synchrotron grazing diffraction techniques are especially interesting for us since they offer the possibility to fully characterize the surface structure of any bidimensional ordered system by measuring the continuous intensity profile distribution along the surface normal direction that contains useful information on different structural parameters of atoms in the surface nearest region. Small angle diffraction techniques are also useful techniques for studying disperse systems at the nanoscale. Size, average inter-particle distance, orientation as well as surface morphology are structural characteristics sensitive to this technique.

Particularly appealing for our research is the possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements that could show an effective magnetic moment. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms. The combination of diffraction, small angle scattering and magnetic/resonant techniques open different possibilities to study different aspects and properties of our systems.

Our Group, consequently, strongly supports the project of surface diffraction beamline proposed for ALBA synchrotron facility.

Yours faithfully

Josep Nogués
ICREA Research Professor

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Cerdanyola del Vallès, 5th November 2014

To whom it may concern:

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

The Supramolecular NanoChemistry & Materials (NANO^{UP}) Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), which I am leading, aims to control the supramolecular assembly of molecules, biomolecules, metal ions and nanoscale building blocks at the nanometer scale for the design and synthesis of novel functional architectures. The Group uses the supramolecular chemistry as the underlying approach for exploring new materials and applications in diverse areas, including micro- and nanoencapsulation, drug-delivery systems, contrast agents and the development of novel sensors and magnetic platforms.

Miniaturization to the nanometer scale regime is a very prolific strategy for the development of new materials with novel and often enhanced properties compared to traditional materials, opening up avenues for technological applications in many areas, including drug-delivery, catalysis, diagnostics, solar cells, etc. The use of supramolecular chemistry to control the fabrication of these nanoscale materials is a key aspect for the future of Nanoscience & Nanotechnology. The Group's main interest is the development of new synthetic methodologies and using these methods to fabricate complex supramolecular assemblies and bioinspired architectures with unprecedented structures and interesting physical and biological properties.

Synchrotron grazing diffraction techniques is a complementary technique to scanning probe ones that also offer the possibility to characterize the surface structure and/or that of a interface between two systems i.e. molecular/(metal,oxide,semiconductor). The continuous intensity profile distribution along the surface normal direction contains useful information on the different structures present at the surface, i.e., molecular supercells, atomic relaxations at the substrate interface, molecular-substrate distances, vacancies...

Small angle diffraction techniques are also useful techniques for studying disperse systems at the nanoscale level. Size, average inter-particle distance, orientation as well as surface morphology are structural characteristics sensitive to this technique.

Our Group, consequently, strongly support the project of surface diffraction beamline proposed for ALBA synchrotron facility.

Yours faithfully

Prof. Daniel Maspoch

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Cerdanyola del Vallès, 5th November 2014

To whom it may concern:

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

The Atomic Manipulation and Spectroscopy Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), which I am leading, seeks to understand and control the quantum properties of electrons in low-dimensional materials.

Reducing the dimensions of a material to the nanoscale leads to the emergence of novel physics, which can be exploited to design devices with enhanced performance or with new functionalities that can enable future technologies. At this scale, the properties of materials are often dominated by quantum size effects and interfacial phenomena, which impose strong limitations on the control and reproducibility of the device performance, but also open up new avenues for engineering physical properties.

The Group addresses this two-edged sword by investigating the interplay between structural, electronic and magnetic properties of nanoscale materials at the atomic scale. We use the knowledge obtained from such comprehensive studies to develop different methods to selectively manipulate the properties of materials. By combining Scanning Tunnelling Microscopy (STM) techniques with Synchrotron Radiation Spectroscopy, the Group correlates microscopic phenomena to macroscopic observables that are relevant for the understanding and design of new materials and devices.

Synchrotron grazing diffraction techniques is a complementary technique to scanning probes ones that also offer the possibility to characterize the surface structure and/or that of a interface between two systems of any ordered system. The intensity profile distribution is continuous along the surface normal direction and contains useful information on different structural parameters of atoms in the surface nearest region.

The possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements that could show an effective magnetic moment. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms.

Our Group, consequently, strongly support the project of surface diffraction beamline proposed for ALBA synchrotron facility. This beamline will offer different diffraction techniques susceptible to provide useful information on several aspects of our systems that would be compatible with that obtained from our current techniques.

Yours faithfully

Dr. Aitor Mugarza

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Cerdanyola del Vallès, 5th November 2014

To whom it may concern:

I hereby express my support to the multipurpose X-ray diffraction beamline, SIRENA, at ALBA.

The Physics and Engineering of Nanodevices Group at the Catalan Institute of Nanoscience and Nanotechnology (ICN2), which I am leading, focuses on the development of novel devices, primarily spintronics, specifically designed to gain insight into physical properties of materials at the nanoscale, combining state of the art lithographic and chemical methods with magnetic and electrical transport characterisation.

Currently, the Group's research is centred on spintronic devices. Spintronics introduces the spin degree of freedom into device design and has been predicted to enable a revolutionary class of electronics with functionalities exceeding current semiconductor technology. Conventional electronic devices are based on charge carriers and their associated energy, which limits their speed due to energy dissipation. Spintronics, which is based on spin orientation and spin coupling, promises much higher speeds, low power demands, non-volatility and higher integration densities. Current developments in the group focus on the use of electron and nuclear spins in novel metallic and semiconducting devices, which ultimately will employ quantum coherent control. Besides computation, there are abundant applications for controlled spin and magnetic dynamics, including biomedical instrumentation, including magnetic resonance techniques, sensors and imaging.

Synchrotron grazing diffraction techniques offer the possibility to fully characterize the structure at the interface between graphene layers and oxide substrates as well as to determine the bulk and surface structure of topological insulators as well as their modifications induced by the influence of adsorbates on them. By measuring the surface normal intensity profiles, it is possible to get information on the chemical composition at the interface between two systems as well as the relaxation behaviour of atoms located in this region. The structural properties can be related with their conducting phenomena.

The possibility of tuning the energy of the incoming photons would allow to carry out experiments at resonance energies of particular elements that could show an effective magnetic moment. This is important to investigate the surface magnetism to determine the distribution and magnetization of the resonant atoms.

Our Group, consequently, strongly support the project of surface diffraction beamline proposed for ALBA synchrotron facility. This beamline will offer different diffraction techniques susceptible to provide useful information on several aspects of our systems that would be very difficult to get with other methods.

Yours faithfully

Prof. Sergio Valenzuela

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FACULTAD DE CIENCIAS
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DEPARTAMENTO DE FÍSICA DE LA MATERIA CONDENSADA

Prof. Enrique García Michel
Dto. de Física de la Materia Condensada
Universidad Autónoma de Madrid

Madrid, November 17th, 2014

Dear Sir, Madam

I am writing you as Head of the Electronic Properties of Novel Materials Laboratory, belonging to the Department of Condensed Matter Physics at the University Autonomous of Madrid (UAM). Our research is focused in the investigation of the structural, electronic and magnetic properties of thin films and interfaces under different conditions, including UHV conditions, a wide range of temperatures and buried interfaces. Our main experimental techniques are Photoelectron Spectroscopy (including ARPES), Low Energy Electron Diffraction, Surface X-ray Diffraction and Scanning Probe Microscopies.

Surface X-ray Diffraction is for us a powerful tool, able to provide valuable information on many properties of the physical systems that we investigate. This technique has evolved from UHV conditions into a wide range of environments, including buried solid interfaces, solid/liquid interfaces and high pressure gas/solid interfaces. It is also suited for dynamical studies such as epitaxial growth, ion patterning, surface kinetics and phase transitions, a topic of great interest for us. Another important feature is the the possibility of tuning the photon energy in order to carry out experiments at resonance energies of particular elements. This is crucial in the investigation of magnetic properties of surfaces and interfaces or to selectively determine the role of a particular atomic species in the surface/interface structure.

In my view, these new research possibilities are complementary with the advanced research tools that we are already using in the characterization of our systems (mentioned above). For this reason, I strongly support this project, since it is an ideal way to achieve a better understanding of the structural properties of our systems and to disentangle the nature of the interaction between adsorbates and substrates at the interface between both. Furthermore, from these structural measurements a correlation with the electronic properties is possible, in order to achieve a full characterization of the system of interest.

Yours sincerely,

Prof. E. García Michel

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Madrid, 18th November 2014

Dear Madam/Sir,

I am head of the "Coatings, Interfaces and Nanostructures Group" of the Department of Applied Physics of the University Autonomous of Madrid (UAM). My research activity is mainly focused in the study of the growth of oxides on oxides substrates as well as their interfaces, oxide nanostructures, growth of Graphene on isolating oxides, and functionalized surfaces for low secondary emission. To this end we use different synchrotron radiation techniques such as high- and low-energy photoemission and absorption spectroscopies under different condition environments. A surface diffraction dedicated beamline able to operate with different in-house/collaborative developed tools to adapt the beamline to the technical requirements needed to perform a requested experiment would be of great interest for our experiments. A huge diversity of supported environments, from UHV conditions to HP/HT catalysis experiments, electrochemistry, coherence and even photoemission using an AFM tip as photo-electron collector would be desirable.

Since X-rays are weakly absorbed by matter, surface X-ray diffraction is not limited to free surfaces under UHV conditions but can be applied with success to buried solid interfaces, solid/liquid interfaces and high pressure gas/solid interfaces. This is of particular importance in the case of heterogeneous catalytic reaction where the role of the catalyst can be studied under real working conditions.

In addition to crystallographic studies, surface diffraction is also suited for dynamical studies such as epitaxial growth, ion patterning, surface kinetics and phase transitions. In particular, ion erosion with ion beams in combination with grazing-incidence small-angle scattering has been employed to study the dynamical evolution of medium range correlations during nanopatterning.

Moreover, the possibility of tuning the photon wavelength allows carrying out experiments at resonance energies of particular elements. This is important to investigate surface magnetism in order to determine the depth distribution and magnetization of the resonant atoms. Resonance can also be used to determine the involvement and role of a particular atomic species in the surface/interface structure.

We believe these new characterization synchrotron possibilities are extremely complementary with the general advanced research tools we are already using in the characterization of our systems. For this reason, I strongly support this project since it is an ideal tool to achieve a better understanding of the structural properties of our systems as well as to know the nature of the interaction between adsorbates and substrates at the interface between both. From these structural measurements a correlation with the electronic properties is possible to a full characterization of the system of interest.

Yours faithfully,

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