# Researchers of the Month 2015

**MARIA RUTE FERREIRA ANDRÉ**
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*1. What are your personal perspectives as a researcher?*

As researcher, I aim to strength the R&D activities in the area of photonics, in the framework of the Group of Functional Organic-Inorganic Hybrids of the University of Aveiro at the national and international levels. In particular, R&D activities related with the development of new materials for the areas of lighting, photovoltaic conversion (luminescent solar concentrators) and integrated optics.

In what concern my R&D, I highlight our contribution to the field of lighting where the recent development of a white LED prototype with enhance light emission properties compared with that of commercial white LEDs made of natural, abundant and recyclable hybrid nanoparticles placed organic-inorganic hybrids as new down-converter phosphors for white light. Are we able to combine other materials in order to further improve their performance as white light emitters?

*2. In your opinion, what are the biggest challenges in your area of research?*

The challenges for the field of photonics are well illustrated by the two recent events related with the attribution of the Nobel Prize in Physics to the three Japanese scientists (I. Akasaki, H. Amano e S. Nakamura) "for the invention of efficient blue light-emitting diodes which has enabled bright and energy--saving white light sources" and the proclamation by UNESCO of the 2015 as the International Year of Light emphasising that light is a key cross-cutting discipline of science and engineering with impact in a myriad of applications that have revolutionized society through medicine, communication, entertainment and culture. Big challenges include, therefore, the demonstration to policymakers and stakeholders of the light potential towards a sustainable technological development, in parallel with the recruitment and formation of young people in this field.

*3. Where are the strengths of the UA in your opinion?*

The University of Aveiro is a multi-disciplinary campus that favours the collaboration between distinct groups in related and complementary areas. The existence of several Associated Laboratories provides the presence of new researchers that have been contributing with knowhow and new ideas and to the attraction of diverse funding. Also, it enables the synergy between teaching (and human resources formation) and research activities that improve the quality of the Masters and Ph.D. programs lectured at UA.

*4. Could you give one idea to improve research in the UA?*

Establish the map of the research that have contributed to the effective growing of UA at the national and international levels and establish the road map for the permanent recruitment of high-level senior researchers, avoiding the migration of consolidated R&D activities.

**RICARDO SOUSA**
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*1. What are your personal perspectives as a researcher?*

After doing Master and PhD thesis in the area of computational mechanics and simulation of technological processes, I have decided to embrace more applied and experimental areas. Next directions to follow, scientifically speaking, are to efficiently combine numerical techniques and experimental validations in a framework integrating design, modelling and assessment for product development in a wide range of mechanical engineering applications, from automotive and aerospace to kitchen utensils.

*2. In your opinion, what are the biggest challenges in your area of research?*

I'm currently conducting two research lines. The first one is devoted to incremental forming processes, a technique that allows you to produce sheet metal formed parts without needing to employ dedicated – and costly – tooling, which makes this process ideal to produce ready-to-use prototypes or small batches of customized parts. The deep implementation of this process into industrial environment has been impaired for two main reasons: large forming times and geometrical innacuracy. So, using a innovative machine built at TEMA labs, research has been conducted in order to improve the process in terms of accuracy and forming time. Results are encouraging. The second research line is related to safety devices in engineering, and particularly on the application of the natural material by excelence – cork – for impact applications, like is the case of helmets. There is still much to be done in this area, not only on material development side, but also on design and injury evaluation. The work has been progressing with a small – but very dynamic – group of researchers. For both areas, there is also the common challenge of finding industrial interest, and funding, to develop final applications.

*3. Where are the strengths of the UA in your opinion?*

UA is a young and dynamic university. The matricial system, without faculties, makes much more easy to access central services and eliminates a good ammount of bureaucracy. Furthermore, it is a University with close relations to the industrial pole of the region, making easier to establish connections and employ students. Geographicaly, it is close to other research centers, like Coimbra and Porto, which estimulates also scientific cooperation. Finnaly, it is a university opened to international students and staff exchange, a university thinking globally. Nowadays, this is quite important to keep pace of technological evolution.

*4. Could you give one idea to improve research in the UA?*

Research fields are becoming more and more interdisciplinary. There has been many innitiatives the show up what has been done in the campus, being the most visible one the Research Day. However, few selected works are present from each Department-Research unit. It could be a good a idea to promote kind of "thematic" research days covering just 2 or 3 research areas (e.g. Chemical, Civil and Mechanical). In this sense, a larger range of works could be presented while maintaining the aspect of crossing-over different research fields.

**VÂNIA CALISTO**
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*1. What are your personal perspectives as a researcher?*

My scientific career is still in a very early stage, as I concluded my PhD only 4 years ago. Yet, I am very passionate about my work and I definitely aspire at building a solid research group dedicated to investigation concerning the presence of pharmaceuticals in the environment and ways of mitigating such problem in a near future. The presence of this kind of micropollutants in the environment is a problem of growing proportions and by building a research group working concertedly and towards a well defined purpose in this field, I expect to make a difference at national and global levels. I really believe in the importance of using science and technology towards the protection of the environment which is strictly related to health and welfare of the human being – this is the driving force that I would like to imprint in my research group. I hope to be able to embrace the right opportunities to fulfill that goal in a near future; naturally, for this, I would have to start by getting a researcher position, hopefully at UA!

*2. In your opinion, what are the biggest challenges in your area of research?*

In the last two decades, there was a huge amount of research performed internationally concerning the occurrence of pharmaceuticals in the environment. So, at this moment, the problem is correctly identified and, in my opinion, it is not sufficient to continue to demonstrate how relevant this issue is without directing our efforts to find a way of minimizing it. It is in this context that the research performed towards the development of new alternatives to effectively reduce the levels of pharmaceuticals in treated urban and industrial effluents is growing in the last years. It is specifically in this area that my main research work is focused. Nevertheless, this is a very challen-ging subject: in fact, most of the tentative solutions to efficiently remove pharmaceuticals (and other micropollutants) from contaminated waters do not jump from being an academic interesting solution to be applied in a real context. So, I believe that creating solutions that are really feasible for a practical application and that surpass the academic gates to the real world is the main challenge of this area of research for the next decade, and the key to properly address this problem.

*3. Where are the strengths of the UA in your opinion?*

UA have a fantastic multidisciplinary campus which enables close proximity between the majority of its Departments and Associate Laboratories and with several very young promising researchers. In my opinion, these two characteristics are extremely important to allow for the development of creative and collaborative work inside UA, which undoubtedly strengths the existence of a common driving force inside the university.

*4. Could you give one idea to improve research in the UA?*

I think UA should improve the efforts to support young researchers (post-doctoral fellows and researchers) which have the extremely difficult task of starting and consolidating their careers in such a troubled period. By correctly selecting and supporting the best researchers currently working here, UA is also protecting the future of its research and research groups.

**MILENE MATOS**
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*1. What are your personal perspectives as a researcher?*

My view of science is that of public utility. Ultimately, every research aims at advancing collective knowledge and in some way seeks providing better life quality for all. Notwithstanding, this understanding is far from being commonly shared whithin societies. Scientists are still regarded as some closed academics, doing things no-one understands and of questionable utility. So, I think it is the researchers' responsibility to change public perspective on the fundamental importance of their own work. Thus, in my opinion science communication is of overarching priority. There is plenty to do, for the sake of science itself, our work and, ultimately, for everyone!

*2. In your opinion, what are the biggest challenges in your area of research?*

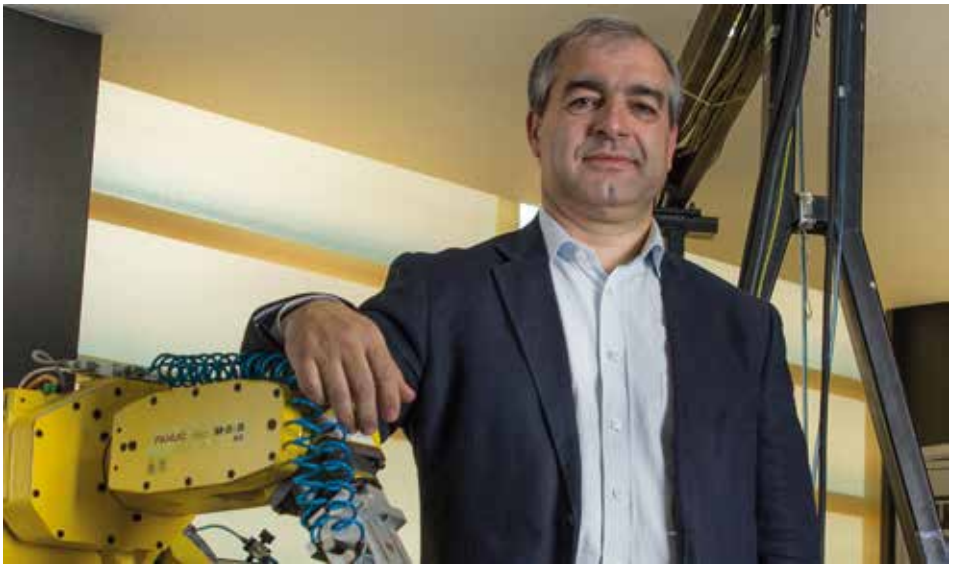
In terms of conservation biology, the biggest challenges are the lack of funding, which in turn is related to the misperception of what "conservation" implies. Unfortunately, despite natural resources, biodiversity and ecosystem services are what support life itself, their management and conservation are far from being priorities in terms of governance. This leads to other challenges, in the field of science communication, scientific literacy and education for sustainability – there is an urgent need of improving these collective skills and perceptions.

*3. Where are the strengths of the UA in your opinion?*

No doubt that the most valuable strength of the UA is its openness to work in practical, straightforward and applied proximity with the society, in the most various aspects. It is an institution that perfectly combines science and cutting edge knowledge with public service and usefulness.

*4. Could you give one idea to improve research in the UA?*

I think that in this period of crisis, where science and technology are bottom public (non)priorities, UA is doing a good job, by improving interdepartmental collaborations, whether through formal platforms, or informal working groups. However, most young researchers rely too much on the national scientific system and funding, which is pretty much out of touch. Thus, UA should incite and support researchers even harder in searching for alternative sources of funding, improving collaborative funding with private companies and create even more international frameworks, presenting UA as a leading institution in new ways of making science.



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*1. What are your personal perspectives as a researcher?*

My long time dreams on technological achievements were concerned with the capabilities of computers doing many things better than humans, and this led my interests into engineering and ultimately framed my research interests into perception and robotics.(...) Locomotion of artificial devices is undoubtedly a field that excites both the general public and experts but, most certainly, the greatest breathtaking moment occurs when humans are faced with intelligent artificial systems that move, perceive and interact. So, this is actually the field that draws my major research perspectives, that is, the development of artificial systems with strong perception and reasoning capabilities allied with human coexistence and interaction by touch and contact.

*2. In your opinion, what are the biggest challenges in your area of research?*

There are scientific and technical challenges, but there are also operational and methodological challenges. And at some point, they intersect and interfere with each other. Engineering is very stimulating, and trying to make artificial systems succeed in imitating human skills is a never-ending venture with surprise and awe at every algorithm and device built and successfully tested. On the other hand, research in engineering can be restricting if restrained by immediate or manufacturing-oriented concerns. One of the main clients of engineering-grounded solutions are the industrial partners who not always share the same deadlines and efficiency metrics as academic researchers. (...) Furthermore, in some highly competitive areas of production, such as for example the automotive industry, advanced research from the academia has little chance of significant cooperations because companies have their research and development activities shielded or protected from external research institutions, most probably due to industrial property concerns.

*3. Where are the strengths of the UA in your opinion?*

The University of Aveiro has a strong commitment on research, which has been demonstrated by the administration policies and all the events promoted both centrally and locally by several labs and research-related units. Opening to internationalization and external cooperations are without question a strong point that makes the research at UA a very promising endeavor. Also, the matrix organization, that is, the philosophy of distributed and unrepeated competences or expertises among the several units, favors the creation of transversal efficient research groups. Although it may not have been fully accomplished for all cases in the past, this is potentially a huge strength that researchers can take advantage of.

*4. Could you give one idea to improve research in the UA?*

With globalization, modern research is hardly a solo activity, and the establishment of groups is a must. So, recruiting or hiring people and create the bonds and interdependencies of skills and competences is the key methodology to successfully set up a lab. One of the central elements in this structure are PhD students, who are required for a successful model of research, because they ensure both the majority of the specific research activities, plus they complete the liaisons with lab technicians and Masters' students with the Post-doc and lab managers. (...) For the sake of research in the near future, a comprehensive assessment of the labs could be carried out to identify and correct these situations.

It seems consensual that fund raising for research has now become a task more challenging than the research activity itself. Therefore, it cannot be expected that everyone stands out in all fronts, like for example, professors that have to ensure so many tasks that little time and resources remain to perform intensive research. So, there should be groups of experts in fund raising and assistance in the preparation of applications for funding. This means that the fund raisers would not be the main spenders of those funds, which is something probably not very popular; therefore, some form of compensation should be devised from the institution to create such a sustainable system.

**HELENA ALVES**
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*1. What are your personal perspectives as a researcher?*

I believe that researchers have a personal responsibility towards society, to help towards technological, societal and economical development. Our contribution cannot stop on scientific advances, solving problems or creating new knowledge and opportunities. We have to envision a closer relationship, taking the generated knowledge into industry and to general public, through actions capable of producing quality, competitive and fascinating products, and to improve education and people awareness of current challenges.

*2. In your opinion, what are the biggest challenges in your area of research?*

I work on organic electronics, which promises new products through a strategy of embedded electronic devices in current objects and new application that are not possible to achieve with traditional inorganic materials. Some of the materials and devices already developed are just looking on forms of scaling up the technology, so they can be competitive and which markets they will fit better. But there are still many challenges in developing materials to fit certain properties and to develop new devices where some of the properties can be taken advantage.

*3. Where are the strengths of the UA in your opinion?*

UA is very strong in material science, with many researchers working on a large variety of materials with many different properties. These can be exploited in many different applications, on energy, health, environmental or communication topics. There are also some relationships with strategic industry sectors, which can facilitate the transfer of knowledge.

*4. Could you give one idea to improve research in the UA?*

A good strategy would be to use the existing knowledge on materials and develop some proof of concept applications of these materials. This would increase the potential interest both from industry and general public.


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