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EDITORIAL

New toxic emerging contaminants: beyond the toxicological effects

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As members of the International scientific community, our responsibility to our planet is based on three main pillars. First, to develop new techniques and methodologies to detect and control all class of contaminants; second, to use our abilities to deliver new modes to clean our waters, soils, and polluted air; and third, and much more importantly, to teach the new generations respect for the environment, the land, and all animal species.

If these three pillars are not achieved soon, a future history can be the following:

An extra-terrestrial intelligence approaching planet Earth would see an incredible blue color spotted with white clouds here and there.

Such alien would easily recognize liquid water on Earth's surface, and every member of the space ship's crew would be anxious to contact the intelligent native species of that blue-white-green planet. The aliens know there is intelligence living on Earth for two reasons: one is because they found an invitation to visit the planet traveling through the deep space (Voyager mission), and the second one is because they detected the radio signals coming from our solar system long time ago.

As the spaceship approaches, the scientific instruments with which the ship is provided start to deliver data.

Firstly, the aliens discover that humans organize themselves mostly in colonies, ranging in size and complexity. The data reaching the alien computers also continuously confirms that there are sophisticated structures, such as the pyramids of Egypt and Mexico, the Chinese Wall, the New York and LA skyscrapers, the bridges, the satellites, and even the international spaceships orbiting among the other planets. The aliens are pleased.

After searching for intelligence thousands of years, they find that planet they are traveling to is inhabited by an intelligent species. How much new knowledge does this species treasure? How will the colonies react upon their arrival? However, other more disturbing data soon replace such questions.

Some of the data reaching their computers do not match what the aliens are expecting.

The atmosphere of the planet is full of chemical compounds, which the aliens know are not formed by natural processes. They find molecules that can only be produced by sophisticated processes, other than life. This is not what scares them the most, as they also produce similar compounds. What scares them the most are the amounts of such compounds. These data do not match those of an intelligent species, and so they decide to hide their presence and send in some explorers, to bring back some water and animal samples.

The secret mission goes back to the mother ship and brings water from the Great Lakes and Oceans, some fishes and small animals from the same place, and thousands of pictures from the planet.

The pictures reveal something intriguing to the aliens. The human colonies spread through the entire planet, but in a number that is considered unsustainable. The advanced alien software reveals that the resources needed to maintain such colonies will collapse soon. Furthermore, the pictures reveal that the organisms that sustain life in the planet by producing the molecule that enables chemical reactions in living organisms (O_2) are systematically destroyed by the intelligent species. Even worse, they find out that there is no initiative to stop

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the destruction or to replace such organisms by new ones. The consequence is the increasing levels of another molecule, very stable, which brings death (CO_2). They easily find that this fatal molecule also increases the temperature of the entire planet to unacceptable levels, endangering the lives and well-being of millions of organisms.

The heads of the extra-terrestrial mission meet to decide how to proceed, and then the results from the analysis of the water and the fishes arrive. The conclusions are devastating. The water contains hundreds of substances from non-living sources, and such substances are directly linked to the intelligent species. And, what is found worst, the very same compounds are encountered in the fishes also.

At this point, the intelligent aliens begin to think that perhaps the dominant species on the planet, even being able to create complex things, is not intelligent, but smart because the question to be addressed is this: which intelligent species is able to destroy the only planet it has for living?

And then, a second question comes out: if this species would find a way to travel to the stars, would this be a danger for other planets and other species, either intelligent or not? If such travel was possibly a fact, would it be permitted for this smart species to travel?

The answer to such a question is upon us.

The U.S. Geological Survey established in 2017 (Geological Survey 2018) any emerging contaminants as all chemicals in everyday life that are used comprising medicines and drugs, especially those sold without a medical prescription. Personal hygiene and sanitation products, including soaps, disinfectants, odors, and any food chemical additives, such as preservatives, colorants, and adulterants are present in the environment, the water, the soil, and the atmosphere are related to different sources, such as municipal wastewater treatment plants, excess from agricultural and urban land surfaces, septic systems, oceans, and rivers. Unfortunately, to these contaminants, we can also still add the classic, heavy metal ions such as mercury, lead, cadmium, thallium, silver, and others that can be found in our lands and water, as well as plastics, microplastics, nanoplastics, and the modern nanomaterials, in the form of metal and soft nanoparticles. Air, water, and soil are continuously being exposed to these intruders and, as a direct consequence, human beings, and all living organisms on the planet as well. One of the most mediatic contaminants during the recent years among the aforementioned are plastics, microplastics, and nanoplastics, being a huge problem in our oceans and river waters (Zhu et al. 2018; Alimi et al. 2018; Kroon et al. 2018).

During these 2 years, since the publication of the special issue devoted to the first edition of the PTIM Conference in Caparica (Lodeiro et al. 2014), more than 1000 documents appear in the literature (source Scopus engine) related to this hot topic, emerging contaminants (Rodriguez-Narvaez et al. 2017; Rodriguez-Navas et al. 2017).

Topics, such as nanomaterials (Fang et al. 2017; Bundschub et al. 2018), drugs (Thelusmond et al. 2018), antibiotics (Christou et al. 2017; Sanganyado et al. 2017; A. Mirzaei et al. 2017; Szekeres et al. 2018), personal care products (Ebele et al. 2017), mycotoxins (Gruber-Dorninger et al. 2017), heavy metals (Schuler and Relyea 2018; Liu et al. 2018), pesticides, and polycyclic aromatic hydrocarbons (PAHs) (Kuppusamy et al. 2017; Primel et al. 2017), have been deeply addressed.

The second edition of the International Caparica Conference on Pollutant Toxic Ions and Molecules (PTIM 2017) was focused on joining superb minds running in any way within the fields of sensing, monitoring, eliminating, or creating pollutant toxic ions and new molecules. The plenary speakers are as follows: Prof. Gerald Zagury (Canada), Prof. Erika Kote (Germany), Prof. Irene Lo (Hong Kong), Prof. Luoping Zhang (USA), and Prof. Tomás Torroba-Perez (Spain). The keynote speakers are as follows: Prof. Aiguo Wu (China), Prof. Ji Qian Jiang (Glasgow, UK), Prof. Javier Arebola (Spain), Prof. Henriqueta Louro (Portugal), Prof. Maria Joao Silva (Portugal), and Prof. Didier Robert (France). There will also be 165 delegates at the conference who will show the most important advances relating to the topic, "New Toxic Emerging Contaminants: Beyond the Toxicological Effects."

The compendium of manuscripts that are presented in this special issue will highlight the work that the scientific community is involved in to save the world for the future generations. We would like to thank all the contributors, as well as the Editor-in-Chief of the Environmental Science and Pollution Research Journal, Professor Philippe Garrigues, and the Springer editorial team, for allowing us to launch this second special issue.

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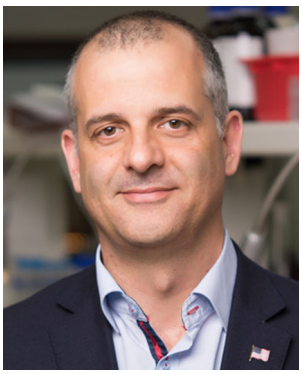
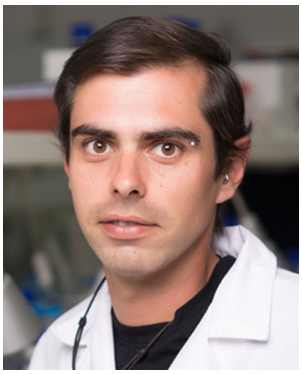
Dr. Carlos Lodeiro (H-index: 35) graduated in Chemistry in 1995, received his PhD in chemistry in 1999 by the University of Santiago de Compostela, Spain, under the supervision of Prof. Rufina Bastida and Prof. Adolfo Rodriguez in the field of Inorganic Supramolecular Chemistry. In 1999, he moved to the University NOVA of Lisbon (UNL) in Portugal as European Marie Curie postdoctoral researcher under the supevision of Prof. Fernando Pina (Photochemistry and Supramolecular Chemistry Group), in a project concerning molecular devices and machines, and in 2004, he became a fellow researcher and invited assistant lecturer at the REQUIMTE-CQFB, Chemistry Department (UNL). In 2008, Dr. Lodeiro got the habilitation in Chemistry in Spain, and a year later in 2009, he moved to the University of Vigo, Faculty of Sciences of Ourense (FCOU), Spain, as IPP (Isidro Parga Pondal) researcher-lecturer. Since 2012, he is assistant Professor at the Chemistry Department LAQV-REQUIMTE Laboratory in the Faculty of Science and Technology, University NOVA of Lisbon. Dr. Lodeiro is Fellow of the Royal Society of Chemistry since 2014 and member of the Portuguese Chemistry Society. In 2017, he got the habilitation in Inorganic Analytical Chemistry in Portugal at the FCT-UNL. Presently, he is a co-head of the BIOSCOPE research group (www.bioscopegroup.org), co-CEO of the PROTEOMASS Scientific Society, and founder co-CEO of the Chemicals start-up Nan@rts. His research interest comprises (i) physical-organic and physical-inorganic chemistry of fluorescence chemosensors; (ii) synthesis of functionalized nanoparticles, nanocomposites, and nanomaterials; (iii) applications of nanomaterials in environmental research; (iv) application of nanomaterials in bio-medical research; (v) supramolecular analytical proteomics; and (vi) onco- and nanoproteomics. C. Lodeiro is author or co-author of more than 235 manuscripts, 1 patent, 14 book chapters, and 5 books, and his publications have more than 4200 citations.



Dr. José Luis Capelo (H-index: 34) got his PhD in the University of Vigo (2002) under the supervision of Prof. Carlos Bendicho and Prof. Isela Lavilla in the field of Analytical Chemistry, made a post-doc in the IST in Lisbon (2002–2005) under the supervision of Prof. Ana Maria Mota, and then he was appointed as researcher at REQUIMTE (FCT-UNL, 2005–2009). Then he moved to the University of Vigo as PI (2009–2012). He was appointed assistant professor in the FCT-UNL in 2012, where currently he is based. Dr. Capelo is Fellow of the Royal Society of Chemistry and member of the

Portuguese Chemistry Society. In 2017, Dr. Capelo got the habilitation in Analytical Proteomics in Portugal at the FCT-UNL. He co-leads the BIOSCOPE research group (www.bioscopegroup.org) and he is Co-CEO of the PROTEOMASS Scientific Society and founder co-CEO of the Chemical start-up Nan@rts. J. L. Capelo has developed research on the following topics: (i) Quantification of metal and metals species in environmental and food samples, (ii) new methods to speed protein identification using mass spectrometry-based workflows, (iii) accurate bottom-up protein quantification, (iv) Bacterial identification through mass spectrometry, (v) fast determination of steroids in human samples; (v) biomarker discovery, (vi) Application of sensors and chemosensor to the detection/quantification of metals and (vii) Nanoproteomics and nanomedicine. J. L Capelo is author or co-author of more than 220 manuscripts, 2 patents, 12 book chapters and 4 books. His h index is 32 and his publications have more than 3700 citations.

Dr. Elisabete Oliveira (H-index: 20) graduated, in 2006, in Applied Chemistry from FCT-University Nova of Lisbon, Portugal; in 2007, she obtained a Master in Biotechnology and completed a PhD degree in Biotechnology in 2010, at the same university under the supervision of Prof. Carlos Lodeiro, Prof. Isabel Moura, and Prof. Susana Costa. In 2013, she obtained a second PhD degree in "Food Science and Technology" by Science Faculty of Ourense Campus in the University of Vigo, Spain. E. Oliveira is author or co-author of more than 62 papers in international peer review journals, 5 book chapters, and 3 books. In 2008, E. Oliveira received the prize in Creativity and Quality in Research Activity in sensors area, attributed by Foundation Calouste Gulbenkian, Portugal, and in 2016, she was awarded with the Prize For Women in Science, "Medalhas de Honra L'Oréal Portugal para as Mulheres na Ciência" in healthy sciences field. Her scientific interests are focused in (i) synthesis of new bio-inspired emissive peptide as fluorescence chemosensors, (ii) supramolecular chemistry (Photophysics and photochemistry), (iii) their multifunctional applications in vitro (solution and solid studies) and in vivo (cell imaging studies), and (iv) synthesis of new emissive nanomaterials, such as quantum dots and silica for drug delivery and biomarker discovery in biological samples.



Dr. J. Fernández-Lodeiro (H-index: 10) received his PhD in 2012 by the University of Vigo-Spain under the supervision of Prof. José Luis Capelo and Dr. Cristina Nuñez. In 2013, he was a postdoctoral researcher at the Faculty of Science and Technology at the University Nova of Lisbon in the REQUIMTE-UCIBIO, working in the BIOSCOPE research group with a PROTEOMASS Scientific Society Research Contract. Lately, during the 14th month, Dr. Fernández-Lodeiro moved to the Institute of Chemistry at the University of Sao Paulo-Brazil working in the LOCSIN research group with Prof. A. Dos Santos and Prof. V. Comasseto, supported with a FAPESP postdoctoral grant and finally with a CNPQ postdoctoral grant focused on the synthesis and application of chalcogen molecules for construction of fluorescence nanoprobes. Since September 2014, he is working in the Faculty of Science and Technology University Nova of Lisbon at the REQUIMTE-LAQV, in the BIOSCOPE research group with a postdoctoral contract from the Foundation of Science and Technology (FCT-MEC), Portugal. His research interest is focused in synthesis of new nanoparticles of Au, Ag, Pt, Pd, Fe, and QD, application of new synthetic methodologies in nanomaterials using chalcogen atoms and environmentally friendly techniques, as well as new molecular probes for biochemical enviromental studies, and proteomics applications. J. Fernández-Lodeiro is author or co-author of 30 manuscripts, 1 patent, three books, and three books chapters.