GYA member Federico Rosei awarded UNESCO chair

Prof. Federico Rosei is the inaugural holder of the UNESCO Chair MATECSS at INRS.

In April 2014 GYA member Federico Rosei was inaugurated into a prestigious UNESCO endorsed chair in Materials and Technologies for Energy Conversion, Saving and Storage. Housed at Institut National de la Recherche Scientifique (INRS) in Varennes near Montreal (Quebec), Canada, the Chair is leveraging funds for training students from developing countries, and will involve a network of research partner universities in Africa, the Americas and Asia. Here Federico tells Connections about his ambition to partner with developing countries in tackling the sustainable energy challenge.

During my formative pre-teen and adolescent years I grew up in Trieste, city of science and crossroads between Italian, Austrian and Slavic cultures. Being the son of a physicist, I often frequented the International Centre for Theoretical Physics (ICTP, www.ictp.it), a category I UNESCO Centre founded by Abdus Salam in 1964 (Salam was awarded the Nobel Prize in Physics in 1979). Within the ICTP building and the adjoining Parc of Miramare I played hide and seek with the children of other physicists, including Salam's son. The vision of an international centre, as a means to promote education and science among students and scientists from all over the world, readily appealed to me already back then.

Later I completed high school at the United World College (UWC) of the Adriatic in nearby Duino (www.uwcad.it), an international boarding school that hosts about two hundred students coming from over eighty countries worldwide. During those two years we lived and studied together and engaged in social activities in the community. Without a doubt, it was the single most important and influential period of my life.

In many ways, the idea of the UNESCO Chair in Materials and Technologies for Energy Conversion, Saving and Storage (MATECSS) can be traced back to those formative years, to the lifelong friendships I made back then with boys and girls from all over the world. Having grown up in an upper middle class Italian family, I had not fully appreciated the privilege of my condition until I met fellow students who had never experienced so many things that I easily took for granted. Many of my schoolmates had never seen the sea, or had never seen the snow, or had never flown on a plane, or had never had running water at home. Those two years were an incredible

eye opener for me. Many of the friendships have been an important part of my life and still are. And many of the choices I have made, personal and professional, have been influenced by that experience.

Since joining the Institut National de la Recherche Scientifique (INRS) in 2002, I have found myself embedded in a stimulating scientific and cultural environment, surrounded by colleagues and students from all over the world. I had the fortune to supervise and interact with over one hundred trainees at all levels, from twenty-four different countries. This rich diversity eventually became an opportunity to implement the MATECSS vision, which itself is the first step towards a longer, more complex plan for international collaboration and exchanges.

When I was growing up, world crises largely revolved around East/West relations. Yet today more than ever the emphasis of human development, as defined by the Millennium Development Goals, is North/South. Close to 20% of the world's population does not have access to electricity; in sub-Saharan Africa, the number reaches 85% for the rural population [1].

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In 2012, which was declared as the Year of Sustainable Energy for All by the United Nations General Assembly, the UN reaffirmed its commitment to increasing access to sustainable energy by declaring 2014-2024 the Decade of Sustainable Energy for All. Implementing the infrastructure for universal access to sustainable energy is a critical scientific and technological challenge, which will require significant capacity building within developing countries. These are some of the reasons why my colleagues and I have partnered to develop the MATECSS concept with our collaborators in the South, to build capacity and create new knowledge in sustainable energy technologies. Energy is the foundation for any type of development. It is the "golden thread" that connects economics, social equity and environmental issues. As such, we hope and expect that in the medium to long term, our efforts will have an impact on education, environment and health in low and middle income countries. Energy technologies are a key instrument of sustainable development and peace-building, and involving emerging countries in MATECSS

The MATECSS chair is a UNESCO sponsored program aimed at making advances in sustainable technologies available to all. The chair includes funding to train young scientists from developing countries in emerging green technologies such as solar cells and other renewables.

will provide an essential synergistic component to the program.

MATECSS aims to address the goal of achieving Sustainable Energy for All though a science-based response built on sharing knowledge on emerging energy technologies. This will be accomplished through a program of visiting professorships, international workshops and student exchanges. In addition, MATECSS will build capacity by training a core group of Ph.D. students from developing countries in Canada (supported by scholarships and tuition waivers) in close partnerships with collaborators in the South, and through the web-based delivery of courses directly to students in developing countries.

MATECSS is conceived to strengthen both North-South and South-South partnerships. We already have confirmed partners in Algeria, China, Costa Rica, India, Mexico, Morocco, Nigeria, South Africa and Vietnam and we are looking for new partners.

The battle against poverty can be won, and science can help.

Emerging technologies have a huge potential to address major societal challenges, including reducing poverty and improving living conditions and quality of life in Low and Middle Income Countries (LMICs) [2,3]. However, it is anticipated that translating advances made in western technology to LMICs would be ineffective and unrealistic [4,5].

Our approach, conceived in consultation with our partners in the South, recognizes that different countries and regions currently have diverse needs in terms of their development potential, so that there is no "one size fits all solution" for addressing energy issues.

In addition, promising new technologies cannot be simply exported to a developing country without ensuring that there is a sufficient "capacity" [4,5], i.e. enough engineers and scientists to convert the energy, sustain its production and distribute it. This global challenge requires resources effective adaptation of technological solutions built from knowledge sharing and capacity building [6]. In this sense it is important to consider that even a small number of highly educated individuals with skills in science and engineering can have a strong impact in their local community and region. This is why the core program of MATECSS is to train a group of motivated PhD students, who can transfer the knowledge and skills they learn during their studies to their country of origin.

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I heard about the Global Young Academy through a collaborator (who also applied and joined at the same time I did). It was immediately apparent that my personal and professional goals were very well aligned with those of the GYA, so I felt thrilled and honoured to be admitted in this group of young, enthusiastic and committed scholars from all over the world. In many ways the GYA reminds me of the days of high school at the UWC, when I was surrounded by idealistic teenagers from all continents, who wanted to build a better world. The GYA looks a lot like a grown up version of my former school. During the annual meeting in Halle last year I breathed a similar atmosphere of friendliness and excitement about working together. I was also delighted to receive a strong letter of support from GYA Co-Chairs Kassen and Slippers when I submitted the UNESCO Chair application in 2013, and to include the GYA as a partner organization for the Chair's activities. Now that MATECSS is officially launched I hope to foster opportunities for synergy and collaboration with the GYA.

[1] World Energy Outlook 2011, International Energy Agency: http://www.worldenergyoutlook.org/publications/weo-2011/
[2] The War on Want, Editorial, Nature 449, 947 (2007).
[3] Nanotechnology and the Challenge of Clean Water, Editorial, Nature Nanotechnology 2, 661 (2007).
[4] F. Rosei, L. Vayssieres, P. Mensah, 'Materials Science in the developing world: Challenges and perspectives for Africa Advanced Materials 20, 4627–4640 (2008).
[5] M. Chaker, F. Rosei, 'Materials Research in Africa: Rising from the Falls', Nature Materials 11, 187 (2012).
[6] D.A. King, Aid to Enhance Africa's Skills, Science 314, 385 (2006).