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Irene Rodríguez Meizoso's research work aims to find alternative ways to fulfill the current demands of chemical products and new designed materials in such a way that it is respectful for the environment and therefore for our health. It focuses on decreasing the massive amounts of toxic liquid solvents used in conventional chemical processes.

She obtained her M.Sc. in Chemistry at the University of Santiago de Compostela, Spain. Her interest for "green technologies" drove her to the Autónoma University of Madrid, Spain, where she obtained her Ph.D. in 2009. During her doctorate, she worked with supercritical fluid (SCF) technology, using supercritical carbon dioxide ($scCO_2$) as a green and clean solvent. Under normal conditions, carbon dioxide is a gas. When it is subjected to high pressure and above 31℃, CO_2 becomes supercritical, a special state that has the behaviour of both gases and liquids. $ScCO_2$ can be used to remove caffeine from coffee beans or extract fragile fragrances from flowers. It has a lower environmental impact than traditional liquid solvents. During her Ph.D., Irene used this technology to extract antioxidants from aromatic herbs and algae. She now aims to further understand how we can use $scCO_2$ as a clean solvent and also what new sustainable processes and innovative applications it may offer.

From a fundamental point of view, it is most important to know how much of a compound can be dissolved in $scCO_2$, i.e. solubility data, since solubility is the key to control all the processes developed with this technology. Implicit difficulties related to high-pressure systems render quantification of compounds difficult with conventional analytical techniques. So far, Irene has developed a new experimental set-up that combines a high-pressure optical cell with a characterization technique (Raman spectroscopy). The aim with the present set-up was to show how Raman spectroscopy coupled to a high-pressure optical cell provides *in situ* information about different solubility phenomena in $scCO_2$. The presented approach has the potential to strengthen our understanding of different SCF processes, which is needed to transfer this technology to safe and efficient industrial processes.

As an innovative application of this technology, Irene has developed a new process based on $scCO_2$ and hot water to obtain, in only one step, fine and dried particles with intact antioxidant capacity, directly from plant materials. Pressurized hot water extraction (PHWE) uses liquid water at temperatures above its boiling point and it is a sustainable alternative for the extraction of antioxidants from natural sources. The powder obtained could be used directly as a "nutraceutical" product or as preservative in food and cosmetic industries.