

## INTERVIEW



### Professor Ronei Jesus Poppi, a chemist with a clear vocation for research, recently gave an interview to BrJAC

Ronei Jesus Poppi  

Full Professor

Institute of Chemistry, University of Campinas – Unicamp  
Campinas, SP, Brazil

Prof. Dr. Ronei Jesus Poppi graduated from the Institute of Chemistry at the University of Campinas (IQ-Unicamp) in 1986 with a degree in chemistry, and holds a master's degree (1989) and a doctoral (1993) degree from the same IQ-Unicamp and a postdoctoral degree from the Free University of Brussels, Belgium (1996).

He is currently a full professor in the Analytical Chemistry Department at IQ-Unicamp. He works mainly with chemometrics and spectroscopic methods of analysis. In chemometrics, he has worked in multivariate calibration, neural networks, support vector machines, curve resolution and methods for processing multimode data. In spectroscopy, his studies have emphasized near- and medium-infrared, Raman, molecular fluorescence and image spectroscopy.

#### Could you tell us a little about your childhood?

I was born in the city of Campinas, SP, Brazil. My father had a barber shop in the 'Bonfim' neighborhood, my mother always worked at home taking care of the family, and I have an older sister. I had no luxury, but I never lacked anything, and my childhood was like that of any other boy growing up in the 1970s in the neighborhood, playing ball on the street all day and dreaming of being a football player.

#### What early influences encouraged you to study science? Did you have any influencers, such as a teacher?

In the elementary school, I was always one of the best students in my class at the state public school named 'Dom João Nery'. When I started taking science classes, I was delighted to be able to understand how things worked. I was very curious to know about the cells in the body, how the light bulb lit or the car battery could generate electricity. At this point, I had a science teacher (Dona Terezinha) who, seeing my interest and how well I was doing in the exams, one day called me aside and said: "You have a lot of potential. You must take a technical course and then go to Unicamp". No one had ever spoken to me like that, and it opened my horizon. I ended up taking her advice, and today I am here.

### **When did you decide to study chemistry? What motivated you? How was the beginning of your career?**

When I finished elementary school, it was already clear to me that I wanted to pursue a career related to science. I intended to attend a technical school, and at the time there were two free schools in Campinas: the Technical School of Unicamp (COTUCA) and the State Technical School 'Conselheiro Antônio Prado' (Etecap), the latter with technical courses in the area of chemistry. To study at these schools, it was necessary to take entrance exams. I enrolled at both schools, and when I went to enroll at Etecap, I visited the school and was very impressed with the chemistry labs and school structure. As I wanted to take a course that involved laboratories and experiments, I opted for the chemical technician course at Etecap. I really liked the area, and at the end of the technical course, I decided to take a course of chemistry at the university. When I finished my bachelor's degree in chemistry at Unicamp, and after having done an internship at a private company in the region, I decided to take a master's degree and follow the research area. My profile is much more suitable for the research area, because I always want to do something new, different and nonstandard. That's what motivates me. I can't work for a long time on the same topic; I'm always changing and looking for new things.

As soon as I defended my doctoral thesis, I had the privilege of being hired at IQ-Unicamp to work in the Analytical Chemistry Department. It's always like that; you need to be in the right place at the right time. I was going to another institution, but at that time Unicamp was interested in the area in which I had specialized. I don't know if today I would be in the same position in another institution, without the facilities that I had at Unicamp at the beginning of my career. I had to learn to teach classes, something I had never done before. This was perhaps the biggest challenge at the beginning of my career. As for research, the beginning was surprising, because I was able to quickly form a group of students and publish in great scientific journals in the area.

### **What has changed in the student profile, ambitions, and performance since the beginning of your career?**

I have been a professor for over 25 years, and I was able to follow all the changes that the Internet and the ease of access to information caused in the world, in education and in students. While at the beginning of my career all information could be absorbed and passed on more slowly, today students have immediate access to content and are no longer interested in disciplines in which it is necessary to retain information in memory. Classes need to be more dynamic and with greater student participation. We need to teach students how to think chemically (or analytically) and not simply show how to push buttons on a device, because the robots will push the buttons in the near future. I can mention an interesting fact in a laboratory class, where it was necessary to know the molar mass of a given compound to prepare a solution. A student took out his smartphone and simply asked the molar mass, which was promptly provided. This exemplifies the fact that much information is readily available and may no longer need to be memorized. The worst is that even today there are professors who prohibit the use of smart phones in class.

*"Classes need to be more dynamic and with greater student participation. We need to teach students how to think chemically (or analytically) and not simply show how to push buttons on a device..."*

### **Could you briefly comment on recent developments in analytical chemistry, considering your contributions?**

The analytical chemistry area, more than other areas of chemistry, is strongly influenced by technological advances. Some tools, which could not have been thought of a few years ago, today are easily available. I believe that today there are two important trends in analytical chemistry. The first is the sensors, which can be spectroscopic, electrochemical and others, which together with the development of microfluidic systems, portable equipment and data processing, enable fast, inexpensive analytical methodologies that can be used for measurements outside the laboratory, as in the field, in process or even in body. For example, to mention my area, interferometers are now manufactured on a chip for ultraportable infrared

systems. The other trend is the technological development of the systems for separation and detection by mass spectrometry, that allow more reliable determinations of low concentrations in complex matrices. I believe that my contribution is in the area of information processing in spectroscopic sensors.

**What are your lines of research? You have published many scientific papers. Would you highlight any?**

My line of research is mainly related to the use of chemometrics together with spectroscopic techniques for the development of new analytical methodologies that are simpler, more practical and faster. Chemometrics, which emerged in the late 1970s, is based on the use of multivariate statistical methods for processing chemical data and has provided the development of methods of analysis that were previously impractical.

I always had a high scientific productivity, having today 280 published articles, about 6,000 citations, and an H index of 39. Regarding highlighting an article, I think it is important to mention a work done by my research group at Unicamp, with the participation of students, and of which I am the corresponding author: "Least-squares support vector machines and near infrared spectroscopy for quantification of common adulterants in powdered milk", published in *Analytica Chimica Acta*. This article has 220 citations and summarizes the main areas of activity that mark my work, such as near-infrared spectroscopy, determination of adulterants in food and use of machine learning.

**Do you keep yourself informed about the progress of research in chemistry? What is your opinion about the current progress of chemistry research in Brazil? What are the recent advances and challenges in scientific research in Brazil?**

I always try to keep myself informed about the progress of research in chemistry, and in Brazil the research in chemistry has had great evolution and has achieved a high degree of excellence. Recent advances in the areas of sensors and analytical methodologies for "omic" sciences are of relevant importance. The main challenge in Brazil is, undoubtedly, obtaining financial resources, which are increasingly scarce, and not obtaining human resources, because we have always had human talent.

*"... intelligent sensors will undoubtedly dominate a large part of chemical analysis, especially now with the advance of the 'industry 4.0'..."*

**For you, what have been the most important recent achievements in the analytical chemistry research? What are the landmarks?**

Among the advances in the analytical chemistry research, the miniaturization of equipment and the new mass spectrometry analyzers can be highlighted. As I said before, intelligent sensors will undoubtedly dominate a large part of chemical analysis, especially now with the advance of the 'industry 4.0' or the fourth industrial revolution. We must also consider the artificial intelligence that will revolutionize many of the analytical methodologies that exist today.

**There are in Brazil and in the world several conferences on chemistry. To you, how important are these meetings to the scientific community? How do you see the development of national chemistry meetings in Brazil?**

Scientific meetings are always important for the dissemination of research that is being carried out, and more than that, for personal contacts to be made. It is in conversations that new ideas, new collaborations and new research emerge. Personal contact is essential to leverage these interactions that often become very impersonal in contacts by email or phone. There are some scientific meetings in Brazil in the area of analytical chemistry which are well consolidated and need to be maintained and expanded so that, in this country of continental dimensions, personal contacts can be made.

**You have already received some awards. What is the importance of these awards in the development of science and new technologies?**

I have already received awards, and the most important thing is that I have already been invited to hold the opening conference at meetings on chemometrics in Brazil. The importance is in being recognized by the academic community as a reference for those who are starting or wanting to enter the research career. It is always important to have references in the country.

**For you, what is the importance of the national funding agencies for the scientific development of Brazil?**

Funding agencies are fundamental to the scientific development in Brazil. Although there is much discussion today about private research funding, which is also fundamental and necessary, I do not know any country in the world with high scientific development that does not have strong public funding for research. We have to do what we can to inform Brazilian society in general about the importance of public funding, that is fundamental to our independence as a free country.

**At the moment, the situation for scientific research in Brazil is one of decreasing investment. How do you see this situation, and what would you say to young researchers?**

I see this reduction in investment with great concern. An interruption now in the studies that are in progress means a break in many lines of research that have been consolidated over many years and that have reached a high degree of excellence. Most often, it is not possible to proceed from the point at which a study was interrupted, as advances are dynamic and make restarting work from the beginning mandatory. I know that the current moment is difficult, especially for young researchers, but it is necessary to continue with the dream because, despite everything, there are many moments of personal fulfillment that, in other fields of work, it is not possible to achieve.

**What advice would you give to a young scientist who wants to pursue a career in analytical chemistry?**

My advice would be: "Chase after your dreams". I did this 30 years ago, when the research situation in Brazil was not good. When I was a postgraduate student, I often received my scholarship payment late or was informed on the day of payment that my payment deposit had been forgotten. This is not good, and it is not happening anymore in Brazil, which is an improvement. However, this did not discourage me, because I always wanted to work in research, despite knowing that I would not receive the highest salaries or benefits that other careers could offer.

*"I would like to be remembered as that researcher who always tried to escape from the conventional in the field of analytical chemistry and was important in establishing chemometrics in the country."*

**How would you like to be remembered?**

I was privileged to be able to develop a line of research that today is important, but that was not very well regarded by the most classic analytical chemists at the time of the beginning of my career. This was most likely due to the lack of knowledge of the topic and lack of vision, but time has shown the importance of my line of research. I also had the privilege of mentoring many masters and doctors, and I believe that this shows my contribution to the development of chemometrics in Brazil. Thus, I would like to be remembered as that researcher who always tried to escape from the conventional in the field of analytical chemistry and was important in establishing chemometrics in the country.

Professor Ronei Jesus Poppi, a chemist with a clear vocation for research, recently gave an interview to BrJAC

---



Current members of the Laboratory of Chemometrics in Analytical Chemistry at IQ-Unicamp. From left to right: Carlos Alberto Teixeira, Victor Kelis Cardoso, Victor Hugo Cavalcante Ferreira, Rássius Alexandre Medeiros Lima, Marina De Géa Neves, Ronei Jesus Poppi, Carlos Alberto Rios, Sandro Keiichi Otani, Aline Guadalupe Coelho, Felipe Bachion de Santana.