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INTERVIEW

Professor José Alberto Fracassi da Silva kindly granted an interview to BrJAC

Professor José Alberto Fracassi da Silva holds a degree in Chemistry from the University of São Paulo (1995), a PhD in Chemistry (Analytical Chemistry) from the University of São Paulo (2001) and completed postdoctoral degree at the Laboratory of Integrable Systems of the Polytechnic School of the University of São Paulo (2003), as well as the Ralph N. Adams Institute for Bioanalytical Chemistry at the University of Kansas, USA (2011).
He has been a professor at the Institute of Chemistry at the State University of Campinas since 2004 and was promoted to Associate Professor in 2019.
His research experience lies in the field of chemistry, with an emphasis on analytical instrumentation. He primarily works on topics such as capillary electrophoresis, electrochemical and fluorescence detection, and microanalysis systems (lab-on-a-chip).

BrJAC: How was your childhood?
Prof. Fracassi: I think that my childhood was fairly normal. My generation was still able to play freely in the streets, and we did not yet have electronic games, so we needed to invent our own toys, which I believe was very beneficial for developing skills. From an early age, I have been curious, and I remember doing simple experiments such as fragrance extraction from flowers, disassembling electronic devices (radios were my favorite), and building fun stuff (e.g., musical instruments—a passion that has stayed with me to this day). Perhaps I was born a scientist, who knows?

I remember getting up early on Saturday mornings to watch the TV series “Cosmos” with Carl Sagan, and by the age of eight, I asked my father to buy me a copy of the book, which I still have.

BrJAC: What early influences encouraged you to study chemistry? Did you have any influencers, such as a teacher?
Prof. Fracassi: I can say that I studied Chemistry by chance. I had a technical degree in Electronics, and when I finished I wanted to have a degree in Mathematics or Physics. But when I was preparing for admission exams at the university, I found that there were many more professional opportunities for Chemists. One day that year I visited the Institute of Chemistry at the University of São Paulo, and realized that Chemistry had many common points with Mathematics and Physics. In particular, I was very impressed by the Raman Spectroscopy laboratory led by Professor Oswaldo Sala. After that day, there were no more doubts about the next steps.

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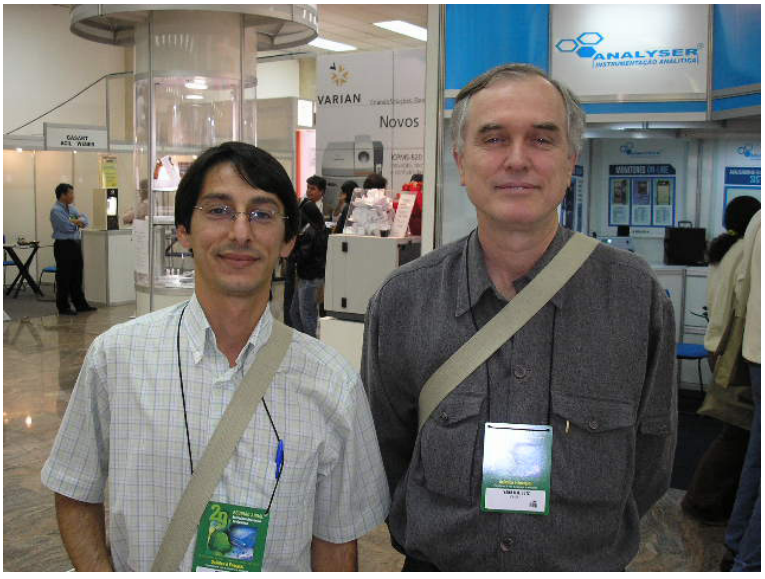
BrJAC: How was the beginning of your career in chemistry?
Prof. Fracassi: To be honest, I did not expect to build an academic career. When I got my bachelor's degree in Chemistry, I applied for a position at an instrumentation company (Mr. Luiz Bravo may not remember, but I had a job interview with him). But I was also getting interesting results from a research project at the university with Professor Claudimir Lucio do Lago, and one day he said to me "Alberto, this could be used in your doctorate". The research was about the development of a non-contact conductivity detector for use in capillary electrophoresis. So, I decided to take this opportunity and started my graduate studies in 1996.

BrJAC: What has changed in your profile, ambitions, and performance since the time you started your career?
Prof. Fracassi: There is a big shift when you move from 'student' to 'researcher/professor' positions. The researching and teaching role requires the ability to perform many tasks simultaneously. Managing multiple projects and securing funding to support them is challenging. At the same time, you have to teach courses and participate in administrative tasks.

As the career progresses, it is natural to become involved in activities with greater responsibility, larger projects, and broader collaborative networks. I am currently serving as head of the Analytical Chemistry Department at the Institute of Chemistry at UNICAMP, and taking on this role was a significant challenge, since you have to deal with many different interests—both personal and institutional.

Throughout the career journey, we learn how to improve performance. My ambition is to deliver the best I can, day after day.



Prof. Fracassi (left) and Prof. Ivano Gutz (right) at the 29th Annual Meeting of the Brazilian Chemical Society in 2006.

BrJAC: Could you comment briefly on the recent evolution of analytical chemistry, considering your contributions?
Prof. Fracassi: The instrumentation for analytical methodologies has evolved to remarkable levels. Today, it's relatively easy (and inexpensive) to integrate microcontrollers and compact sensors. I thank my former advisor, Professor Claudimir Lucio do Lago, for sharing with me the project of the capacitively coupled contactless conductivity detector (C^4D) – today, one can find commercial products with this type of detection for capillary and microchip formats.

In another direction, protocols involving lab-on-a-chip are well accepted today, and important advances toward organ-on-a-chip, or even body-on-a-chip, have been noted. Our group has contributed to developing

alternative methods for the production of such systems. The use of 3D printing has significantly accelerated the prototyping of microsystems. Our group has contributed to pushing these technologies to the limit to produce fully functional microfluidic devices.

BrJAC: What are your lines of research? You have published many scientific papers. Would you highlight any?
Prof. Fracassi: I have been focusing on the development of methods and instrumentation for capillary electrophoresis and lab-on-a-chip microfluidic platforms. More specifically, we have developed strategies for microfabricating devices and sensors for electrochemical and fluorescence detection, as well as creating novel materials for sensing and device integration.

We have also been interested in bioanalytical applications, with a focus on detecting reactive oxygen and nitrogen species and peptides. More recently, we have adopted additive manufacturing (3D printing) to directly fabricate complex microfluidic systems.

In this regard, I would like to highlight a recent paper published in Lab Chip, one of the most important journals in the field, which describes a very straightforward procedure to enable conventional 3D printers to produce multi-material devices (10.1039/d3lc00356f).

The ability to combine materials during device fabrication is of great interest, as it enables the integration of multiple functions into a single platform.

BrJAC: 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?
Prof. Fracassi: I'm very glad to say that the Analytical Chemistry community in Brazil is very active. I don't think it's an exaggeration to say that each specific area within Analytical Chemistry has Brazilians who are among the leaders in the field. Therefore, I see that scientific research in Analytical Chemistry in Brazil has reached a level of maturity.

Perhaps, the focus for the future would be increasing the impact of the research, which can be achieved by establishing of collaborative networks and increasing investments in scientific research in Brazil.

I can highlight the successful initiative of the Federal Government regarding the implementation of the National Institutes on Science and Technology (INCTs). I hope for more initiatives of this type.

From left to right: Prof. Sue Lunte, Prof. Christian Amatore and Prof. Fracassi at Pittcon 2015.

BrJAC: For you, what have been the most important recent achievements in analytical chemistry research? What are the landmarks?
Prof. Fracassi: This is a difficult question for me because I have the bias of focusing on my actual field. However, if I had to choose one, I would pick the advances in mass spectrometry. I am always impressed with the improvements in spectroscopic resolution, and also the increased sensitivity. Mass spectrometry has taken a leading role among analytical methodologies.

BrJAC: There are, in Brazil and in the world, several conferences on chemistry. To you, how important are these meetings to the chemistry scientific community? How do you see the development of national chemistry meetings in Brazil?
Prof. Fracassi: For me, meetings are important channels for the exchange of experiences in research and the establishment of collaborations, which can significantly accelerate scientific development. Also, meetings offer the opportunity to follow the most recent advances in science.

In particular, for young investigators and students, conferences are very important for strengthening research links (many funding agencies use international engagement as a criterion when evaluating proposals). Personally, I find smaller meetings more productive than large broad conferences.

Prof. Fracassi at Pittcon 2015.

BrJAC: What is the importance of awards for the development of science and new technologies?
Prof. Fracassi: Personally, I do not put too much emphasis on awards and prizes. In general, I view awards as a form of community recognition for an entire body of work, typically granted to individuals at the level of senior researcher. In my humble opinion, the creation of too many awards tends to dilute their overall significance.

BrJAC: For you, what is the importance of the national funding agencies for the scientific development of Brazil?
Prof. Fracassi: Funding agencies are of utmost importance for scientific and technological development. There is a strong link between fundamental research and the high-quality training of human resources. However, I do recognize that other sources, such as partnerships with companies, can complement the budget needed to support the research activities.

BrJAC: 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?
Prof. Fracassi: I have to state that conducting research in Brazil is not easy. I am lucky that my research interests do not rely on the acquisition of prohibitively expensive equipment. As a result, my group is able to carry out most of our research using accessible instrumentation.

Conversely, characterization techniques typically involve large-scale equipment, which is often shared within institutions (e.g., scanning electron microscopes). Therefore, it is advisable to participate in collaborative research networks and to establish centralized facilities that consolidate resources and serve the widest range of users.

Another major and growing concern relates to scholarships. There is little value in maintaining a research infrastructure if you do not have people to utilize it. I often say that Brazil needs a long-term development plan of 30, 40, or 50 years, that is not linked to the executive government of the day. Science and technology are strategic assets for the well-being of the nation and cannot be left out of the discussion.

BrJAC: What advice would you give to a young scientist who wants to pursue a career in chemistry?
Prof. Fracassi: Each person is unique, and so is their life path. However, I think that one thing is common: try to follow a career that excites you, which you enjoy at the present moment. If someone is happy in their work, success will come.

Of course, continual learning is also required to achieve excellence in any field, so never stop following the latest advances in the field.

BrJAC: For what would you like to be remembered?
Prof. Fracassi: I would like to be remembered as a person who added positive things wherever I went, and who treated others with respect and kindness.