Introduction
The Indian Institute of Technology Bombay is a worldwide leader in education and research. In this interview, Professor Debabrata Maiti, an associate professor in the Institute’s Department of Chemistry, shares his perspective on some of the challenges in modern chemistry education and research. He also explains how Reaxys helps his research group to overcome research obstacles.
“Reaxys offers answers that you cannot find using publicly available search engines because it is designed for chemists.”

—Dr. Debabrata Maiti, Associate Professor at Indian Institute of Technology Bombay

The Indian Institute of Technology Bombay (IIT Bombay) was established in 1958 and has grown to become a worldwide leader in education and research. Its mission is to create a space for new ideas and prepare future leaders and innovators in engineering and science. IIT Bombay collaborates with national and international universities, governments and industries to keep pace with the expanding frontiers of knowledge and global developments. Its impressive list of research projects focus on a range of modern problems with innovative solutions, including: an artificial, implantable pancreas for diabetics; combination drug programs for tuberculosis; energy-efficient air conditioners for tropical environments; using crystallization to shape materials; improved waste management; and improved crop planning. IIT Bombay also has a reputation for outstanding graduates from its Bachelor’s, Master’s and PhD programs. All courses are approved by the institute’s senate, but the faculty still enjoy a great deal of autonomy in the design of the curricula, ensuring dynamic, constantly evolving education.

We recently interviewed Professor Debabrata Maiti, an associate professor and head of the Maiti Group in the Department of Chemistry of IIT Bombay, to get his perspective on some of the challenges in modern chemistry education and research.

Background

As head of the Maiti group at the Indian Institute of Technology Bombay, do you see your primary role as an active researcher or as a mentor of young researchers?

I feel the two roles are intertwined. I always say I’m an active researcher who shares new ideas, excitement and the joy of discovery. With a group of young researchers, it is important not to force a single direction or viewpoint. There must be room for their ideas. The only way to successfully lead a bright and intelligent group is to be a mentor that shows possible paths, guides them without forcing a single solution, but always helps them overcome the challenges of research.

You have had a Reaxys PhD Prize finalist from your research team.

That’s correct. Mr. Sukdev Bag was one of the finalists of the Reaxys PhD Prize 2016.

What is the value of the Reaxys PhD Prize to you?

I have always been enthusiastic about the Reaxys PhD Prize, and nominated interested students. As it is a very competitive prize, being one of the finalists is a great achievement. It also opens up a new network for a young researcher, which is critical to their career development. I want my students to be among the Reaxys PhD Prize winners or at least finalists every year! I am ready to nominate more of them when the Reaxys PhD Prize returns. The future of science is completely dependent on young researchers — and more precisely, on young minds. They can bring new ideas to the table and have the courage, even the audacity, to push them forward in the face of traditional opposition. Encouraging young minds and involving them in research is the only way to support upcoming scientists, and it can have great benefits for the future of our world.

Professor Debabrata Maiti is an associate professor at Indian Institute of Technology (IIT) Bombay. His research is focused on remote C-H functionalization; drug diversification; and the synthesis of pharmaceuticals and value-added compounds.

Sukdev Bag is a researcher in Professor Maiti’s laboratory at IIT Bombay. His research focus is remote C-H functionalization. He was a finalist for the 2016 Reaxys PhD Prize.
Challenge

Some of your group’s current projects concern biomimetic chemistry, organometallics and transition metal catalysis. Could you briefly explain the applications and importance of these areas?

Our current projects are mainly in organometallic chemistry, biomimetic chemistry and methodology for the synthesis of valuable products including pharmaceuticals and natural products. The mimicry of nature is a major target for researchers. Our biomimetic research is mainly the mimicry of enzymatic reactions. This could have applications in many areas of medicine and chemistry.

Our new synthetic methods are based on new catalysts and substrates designed. The use of expensive methods in industry is still one of the major concern. Our aim is to overcome some of these challenges by developing a method of benignly recycling the catalyst for sustainably longer chemical processes.

Our major research interest is distal aliphatic and aromatic C–H functionalization with the aid of a metal catalyst. The greatest challenges are in the design of the directing group and new concepts for catalytic use of that directing group.

Are there challenges you face that are not specifically related to a project?

Receiving enough funding to realize our research objectives is a constant struggle that I’m sure any scientist will confirm! And of course, the accessibility of information is always a major topic. As a chemist, I believe that research solutions — databases, search engines, cheminformatics tools — are required in every step of the chemistry experiment. We need them to help researchers to formulate clear ideas, find specific ideas, work with the published and experimental data, and more.

Solution

What is particularly important to you as an innovative chemist when it comes to data and research solutions such as Reaxys?

Structure-related searching is one of the most innovative and important techniques in cheminformatics. The structure search in Reaxys takes us directly to the answer to our problem and is a highly concise, efficient technique to overcome challenges in experiment design and methodological study.

Beyond that, knowing the publication provides us important background details on the data. Reaxys provides us with important knowledge. The access that Reaxys provides is unparalleled in the modern scientific world. We can use it to find relevant peer-reviewed literature, patents and so on, not just structures and synthesis pathways.

Impact

Did you personally use Reaxys in education?

Yes. When my students come with problems and some new results, I first search in Reaxys to find any solutions and the cross-check the ideas with previous reports to confirm whether we have new and exciting results or something that is already known.

What do your students say about Reaxys?

My students are frequent users of Reaxys. It is very useful for any kind of chemistry-related search. When they need to set up a reaction or check the products, Reaxys comes to mind first as the way to search for related previous reports. They are mostly satisfied.

Are there any challenges that you have overcome using Reaxys?

As a researcher, there have been countless occasions when our research group was stuck at a problem. In many such cases, Reaxys came to our rescue by helping us to find the solutions. Reaxys offers answers that you cannot find using publicly available search engines because it is designed for chemists.
Reaxys
Reaxys helps customers drive successful chemistry research and education by providing the shortest path to relevant literature, patent information, valid compound properties, and experimental procedures.

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