Meet Dr. Dimpy Kalia, Thieme Chemistry Journals Awardee 2025!

Dr. Dimpy Kalia *completed her M.Sc. (Hons.) in chemistry from Panjab University (Chandigarh) in 2004. After a little over a year at Aurigene Discovery Technologies Ltd. (Bangalore) as a synthetic organic chemist, she joined CDRI Lucknow to pursue her Ph.D. degree. In 2011, she began a second stint at Aurigene and worked there for a year before moving to the USA for postdoctoral research at the University of Maryland, College Park. Upon returning to India in 2013, she worked at IISER Pune for six months as an IISER Fellow before moving to the Department of Chemistry at the Savitribai Phule Pune University (SPPU) as a DST-INSPIRE faculty to start her independent research and teaching career. In 2018, she moved to IISER Bhopal where she is currently serving as an Assistant Professor.*

Thieme: Which field of organic chemistry are you interested in the most and why?

Dr. Kalia: My major interest is chemical biology. This area interests me the most because I believe that organic chemistry can contribute tremendously towards understanding complex biological phenomena.

Thieme: Following that, what is the focus of your current research activity?

Dr. Kalia: My research group employs organic chemistry to address questions of biological importance and clinical relevance. Over the last decade, my group has pioneered the development of several novel chemical technologies for labelling proteins site-specifically. These technologies facilitate the development of protein–small molecule conjugates as therapeutics for diseases such as cancer, and contribute to basic science efforts by enabling facile platforms for labelling proteins with fluorescent dyes. The other major focus of my lab is to develop a chemical biology toolkit for studying bacterial signaling mechanisms. In this area, we are focusing on the bacterial second messenger, c-di-GMP, and have been successful in developing a chemoproteomic platform based on photocrosslinkable c-di-GMP probes for the discovery of bacterial proteins that interact with this second messenger. We have also developed an optochemical photo-proximity labelling platform for the discovery of protein–protein interactions in bacterial cells with high spatiotemporal control.

Thieme: What do you think about the modern role and prospects of organic chemistry?

Dr. Kalia: Organic chemistry has tremendous prospects especially at the interface of chemistry and biology, where most of my research interests lie. Organic chemistry has driven the establishment of extremely powerful chemical-biology-based technologies that are making important contributions to biological research. A great example is the “Click Chemistry” reaction that has had a huge impact on modern biological science. Going forward, organic chemistry will continue to make major contributions to biological research on proteins, carbohydrates, nucleic acids and lipids.

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Thieme: Which difficulties are there for young upcoming chemists in your field? Do you have any tips?

Dr. Kalia: In my opinion, a major challenge as a young researcher is to come up with a suitable research problem to study. All research problems are worth studying, but it is important to strike the right balance between choosing something that draws from one's strengths and yet enables one to branch out towards new areas. For example, I had no training in cloning and protein expression starting out as an independent researcher but that did not deter my lab from going in these areas. This was only possible because all our projects in these areas were still firmly rooted in our strength—developing new chemistry that could work well under physiological conditions. Only after we developed the chemistry and had something encouraging, did we go out and learn molecular biology techniques such as site-directed mutagenesis and recombinant protein expression to test out our chemistry on proteins. Developing this new expertise has now allowed us to work on proteins involved in bacterial signaling which may appear to be far removed from our core strength in organic chemistry but it is important to remember that we would not have been able to go in these new directions without capitalizing on our strength in organic chemistry.

Thieme: What is your most important scientific achievement to date and why?

Dr. Kalia: My research group's most important scientific achievement so far is developing a robust approach for labelling proteins at any desired site by employing our Baylis–Hillman orchestrated Protein Aminothiol Labelling (BHoPAL) technology (published recently in *Nature Communications*). This chemistry is remarkably efficient and proceeds quantitatively within minutes under physiological conditions. What makes this approach truly universal and widely applicable is that using a LAP tag-based approach that we describe in our paper, we can perform protein labelling using BHoPAL at any desired site on any protein. Therefore, I believe that this technology can truly contribute to modern clinical and biological research by enabling the development of protein-based therapeutic agents such as antibody–drug conjugates for cancer therapy, and for generating fluorescently labelled proteins for basic science applications.

Thieme: Could you tell us something about yourself outside the lab, such as your hobbies or extra-work interests?

Dr. Kalia: Outside the lab I enjoy going for long runs and spending time with family.