

Turning ideas into reality

Scientists at the Tata Chemicals Innovation Centre don't just dream up new ideas every day, they also work towards leading the ideas to commercial fruition

These are exciting times for the Tata Chemicals Innovation Centre. Having recently caught the attention of the world with Tata Swach, the new nanotechnology-enhanced water purifier, the centre is now eagerly looking forward to seeing its next big idea become a commercial reality.

Murali Sastry, chief scientific officer, Tata Chemicals Innovation Centre, says, "We are very excited about our work. We are a small team of 35 scientists, including 19 PhD scientists. We also have a good interdisciplinary mix. We have in our team physicists, chemists, chemical engineers, microbiologists, molecular biologists and biotechnologists. The varied expertise is very helpful to us." Mr Sastry himself has a PhD (Physics) in thin film technology from the Indian Institute of Technology (IIT), Madras.

Freedom of choice

Like him, most of the scientists are revelling in the creative freedom that Tata Chemicals assures its scientists at the innovation centre. The company allows them to follow up on any idea that they think has potential, no matter how disruptive that idea may seem. This freedom, combined with the constraints and restrictions that the demands of commercialisation often lay on the team, is one of the hallmarks of working at the centre.

Says Mr Sastry, "In academia, scientists have a lot



Chief scientific officer Murali Sastry steers the innovation centre and heads the advanced materials vertical that undertakes research in the area of nanotechnology.

of freedom to pursue ideas of interest. Conversely, there is a lower degree of accountability as also less pressure to perform and meet deadlines and almost never, a need to take a product to market. Publishing papers is considered important and good enough. Corporate R&D, on the other hand, is more stressful. There is a higher risk environment. But it gives you the satisfaction of seeing the research you have carried out become a reality. At the innovation centre, I think we have the best of both worlds."

Buoyed by the creative environment, scientists are striving to do their best to live up to the centre's mandate of enabling Tata Chemicals to get into newer businesses. The mandate, unique in the Tata group, has already proved its merit through Tata Swach.

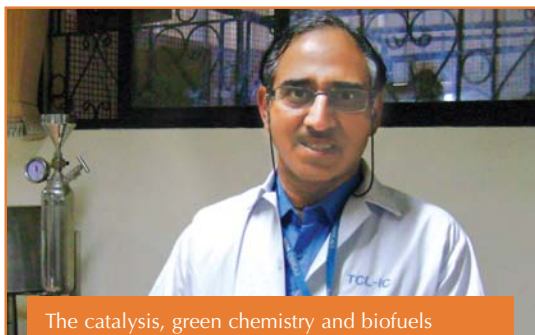
The freedom is extended to the internal working of the centre. While scientists work for different verticals, the structure is characterised by the lack of hierarchy. Should a scientist have a brainwave relating to another vertical, she / he is free to express the idea, move to the other vertical and start work there.

Says Mr Sastry, "Often companies tend to compartmentalise. They operate on a need-to-know basis. At our centre, even temporary staff know what work is happening across different verticals. We also believe that scientists from another vertical might have a great idea about a vertical that they don't belong to, as they are free from certain preconceived notions and therefore not prejudiced."

He also feels that the process of discovery should not be forced into a regimental straitjacket. He adds, "If you have a regimented process, you will not have any breakthrough innovation. It will be incremental at best."

Exploring every possibility

A similar process of encouraging breakthrough innovation, and one that Mr Sastry endorses, is the Tata Group Innovation Forum. This forum consists of innocusters, which are clusters of companies with similar technological needs. These clusters work on



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subjects such as nanotechnology, the biggest cluster for which Mr Sastry is the coordinator, polymers and composite materials, IT and water.

The nanotechnology cluster consists of Tata Pigments, Tata Chemicals, Tata Steel, Tata Motors, Tata Power, Tata Advanced Materials, Titan and Tanishq. Some of these companies are still trying to discover what nanotechnology can do for them. This has resulted in a number of collaborations and business opportunities for the centre.

Mr Sastry's belief is that a conducive environment for research requires that teams be nimble. He says, "In my opinion, the days when huge R&D centres of a 1,000 people worked on one or two areas of interest are gone. The time has come when you have to be extremely receptive to the environment. You have to react very quickly to any change. You can't do that if you are too big." In the next two years, Mr Sastry would like the centre to grow to 70-80 scientists.

Currently, the centre has four verticals: Advanced materials, managed by Mr Sastry himself; catalysis, green chemistry and biofuels, headed by Rajeev Kumar, a catalysis scientist of international repute and a former colleague of Mr Sastry at the National Chemical Laboratory (NCL); nutraceuticals, headed by Uday Avalakki; and biochemicals and metabolites headed by Ashok Kumar Dubey.

Advanced materials is the vertical that undertakes all research in the area of nanotechnology. This

technology gives a completely different property compared to the parent material, enabling scientists to achieve a range of new applications. Tata Swach, which relies on rice husk ash impregnated with nano silver particles to purify water, is the work of this team.

The catalysis, green chemistry and biofuels vertical focuses on sustainable and green chemical transformations, the development of catalysts and catalytic transformation processes for clean fuels and chemicals and alternative energy.

The nutraceuticals vertical is concerned with traditional and non-traditional food ingredients which, when included in foods, would give health benefits. The company is in the process of launching a business called nutraceuticals. This will consist of a range of products, including fructo-oligosaccharides and galacto-oligosaccharides.

The biochemicals and metabolites vertical specialises in replacing chemical processes with biochemical processes through genetic engineering. The team is currently working on xylitol (a natural sweetener), on enzymes and on microbial biodiversity.

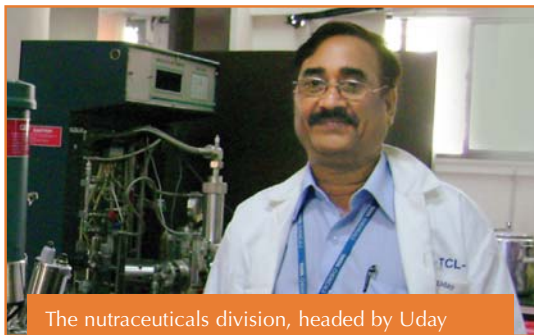
These are the verticals that the centre plans to concentrate on now, but Mr Sastry does not rule out the possibility of something completely different in the future.

He says, "About one-and-a-half years ago, we could not have predicted that we would have a nutraceuticals product. Similarly, we have no idea what we will be doing in the future and I love the fact that I don't know what it is going to be. It would be very uncomfortable for me if someone would tell me that this is the way that the centre will look five years from now."

A clear idea

Because of the extremely sensitive nature of their work, scientists have to be very agile in their operations. The centre uses a stage and gate approach for project management. Mr Sastry says, "Even at the ideation stage, the scientists are trained to focus on generation of intellectual property (IP). We do not take up any project that will not generate intellectual





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property. We are in the business of knowledge chemicals and knowledge processes, and IP is crucial here.”

Therefore, even at the ideation stage, scientists are taught to examine all the patents that exist on a particular material or process. This knowledge also saves them from unwittingly infringing on another company’s patent.

Later when making the presentation, they are trained to put together a small business plan which talks about the technology that they are proposing, what is unique about it, how it fills a gap which might exist in the patent literature, etc. The economics of the proposed business plays a vital role at this point. Projects are severely tested on their commercial feasibility.

Once the idea passes through, a detailed scoping is done. Then the questions begin to get more rigid. By this time, the scientist is expected to have a little more understanding of what the market is like, the unique opportunities, etc. Once the plan passes this critical stage, scientific work begins in earnest.

Safety, health and environment issues are very seriously considered. Mr Sastry clarifies, “Is it green? Will it give us energy savings somewhere? Will it give us carbon credits? These things are becoming very important and we use them as discriminators to decide what project we will do.”

The centre also encourages collaborations with academia. Mr Sastry says, “There are people in academia who have good ideas, but don’t have a business focus. Once you bring in that business focus, then you can often generate an innovative product. Such crucial linkages have only lately begun to be forged in India.”

Currently the centre has a project running at IIT Madras, one at NCL and two at the Massachusetts Institute of Technology at Boston. In the past, the centre has worked with the Ohio State University in Columbus, the Georgia Institute of Technology and NanoDynamics in the US. In India, they worked with

the Central Glass and Ceramic Research Institute in Kolkata and with the Delhi University.

Whenever the centre funds research in any academic institution, it owns the IP that comes out of the research. If there is a significant contribution from the partner, the IP is co-owned along with the academic institution. But the first right of refusal in terms of commercialisation rests with Tata Chemicals.

The centre has also worked with many other Tata companies such as Titan Industries, Tata Motors, Tata Advanced Materials, Advinus Therapeutics, Tata BP Solar, etc.

In the future, the centre would like to dedicate a vertical to water, to consider different technologies related to water, such as newer versions of the Tata Swach, desalination or the treatment of industrial water.

Mr Sastry says, “The centre has evolved well in terms of the processes, the technologies that we have put in place and the philosophies that we have brought in, where there is a certain amount of freedom to think and ideate, independent of any consistency with any existing business.”

The scientists have settled into their grooves at the centre, thus ensuring it has little trouble with attrition issues. Already the combination of dedication and freedom has inspired the scientists to push the boundaries of what might be possible. They have learned to view the need to generate economic value for the company as a challenge. This has resulted in 31 patents for the innovation centre, including 10 international patents.

Mr Sastry says, “But ultimately the proof of the pudding is in the revenues. The revenues of Tata Swach will clearly show that R&D is meaningful.”

Basking in the favourable response that Tata Swach has received, scientists at the centre are excited and looking forward to the commercialisation of their next accomplishment. ●

Cynthia Rodrigues