CHEMICAL ENGINEERING ASSOCIATION

NITT

# Chemie Newsletter

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# FROM THE EDITOR'S DESK

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To young kids summer directly translates to vacations, fun n frolic, sans school and homework. To slightly older kids like us it's not exactly the same!! And to people in one of the 'so called premier institutes' of India, owing to peer pressure or I know not what, there is a craze to do something worthwhile with their summers, say a project or internship. Though pretty much everyone manage to get one of these, weather it turns out to be a productive endeavour is a big question mark!!

Whiling away a lazy afternoon in facebook, I ended up talking to a friend, who is supposed to have managed to bag a really cool internship which many would envy, but alas two minutes into to conversation I realized maybe it wasn't as interesting thing as the rest of us thought. Having been set to a problem statement and barely been given any guidance wasn't a productive period according to our victim!!

But prodding beyond this, I have a few questions lingering in my mind: Are these trainings only an academic venture? Or do they go beyond?? And what if I really am unable to crack my task!! Does it mean I am not capable? Or is my technical knowledge insufficient? At a personal level I believe these should go beyond academics. It should be about learning industrial etiquette, corporate culture etc in case of an industrial training or about literature reviews and similar things in case of institutional trainings. If the opportunity of being with people of varied cultures presents itself, one could make use of it to absorb new cultures. And best of all the training could be made a platform to meet new people and make a lot of new friends. And the millions of photos that come up on social networks just prove beyond doubt that many of them have experienced it firsthand!!

So in this issue, we intend to bring out to you ones experience beyond books! □

Cheers

Editors

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# THE RISE OF NANOTECHNOLOGY

-Aishwarya Kumar
Batch 2014

Nanotechnology is widely defined as "the science of engineering matter at the atomic and molecular stage". It is the unique properties of materials manufactured or engineered at this level that has led supporters of nanotechnology to claim it could be used to benefit mankind in many ways, from treating cancer to preventing pollution

Materials and applications based on nanotechnology are in use in almost all sectors from personal care products, food packaging and textiles, through to coatings, electronics and automotives. In the early days of the technology's development, small companies and university spinoffs were leading the way, but the presence of a number of major chemical companies is increasing the pace of change

One leading innovator in the field is Oxonica, which developed as a spinoff from the UK's Oxford University in 1999. Oxonica's proprietary technologies allow it to rapidly create prototype nanoparticles, typically in the range of five to a few hundred nanometres, and evaluate the differences in their properties to identify nanoparticles with appropriate functionality to solve a given problem.Oxonica's Optisol is a micro-fine titanium dioxide incorporating a small amount of manganese in the crystal lattice. This allows UV energy to be dissipated virtually eliminating the generation of free radicals.

The company has also used its technology to develop Envirox a combustion catalyst which when added to diesel fuel has been shown to lower costs by reducing consumption and reducing emissions of carbon dioxide and other harmful exhaust materials. Engine modifications are not required to use Envirox. The fuel borne catalyst is being used by international public transport group Stagecoach. The company said that over the past five years Envirox had reduced $CO_2$ emissions from its UK bus fleet by more than 100,000t.

## Nanotechnology for wastewater:

There can be no doubt that water preservation and usage are among the very highest priorities for Environmental Protection Agency (EPA) and for stakeholders generally concerned with sustainability and environmental protection. Here are just a few illustrations of the applications of nanotechnology in this area:
Fullerenes as pollution tracers— EPA is supporting fullerenes research to evaluate the likelihood of contaminants reaching aquifers and to provide contaminant-fate information to assist in developing remediation strategies. Fullerenes, also known as C<subscript 60>60 or buckey balls, are nonpolar molecules composed of pure carbon. They are well suited to serve as tracers because they dissolve readily in many organic solvents and can easily be modified by the addition of different functional groups to match the reactivity and solubility of the contaminant of interest. According to EPA's National Center for Environmental Research, fullerenes are believed to be nontoxic. The only health effect associated with them is an inhalation risk, one that is unlikely to arise in this application.
Nanoporous ceramic— Researchers at the Pacific Northwest National Laboratory, Richland, Wash., are experimenting with a chemically modified nanoporous ceramic that can remove contaminants from waste streams. Called a nanosponge, this SAAMS (self-assembled monolayers on mesoporous supports) material could be used in environmental applications such as drinking water purification, wastewater treatment and site remediation.
In the future, wastewater remediation technologies likely will differ significantly from those now used. The opportunities for innovation are limitless and readers are urged to stay on top of the many potential environmental applications of nanotechnology.

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## The question of nanotechnology safety:

As with any new technology, the safety of nanotechnology is continuously being tested. The small size, high reactivity, and unique tensile and magnetic properties of nanomaterial's—the same properties that drive interest in their biomedical and industrial applications—have raised concerns about implications for the environment, health, and safety (EHS). There has been some as yet unresolved debate recently about the potential toxicity of a specific type of nanomaterial—carbon nanotubes (CNTs)—which have been associated with tissue damage in animal studies. However, the majority of available data indicate that there is nothing uniquely toxic about nanoparticles as a class of materials. In fact, most engineered nanoparticles are far less toxic than household cleaning products, insecticides used on family pets, and over-the-counter dandruff remedies. Certainly, the nanoparticles used as drug carriers for chemotherapeutics are much less toxic than the drugs they carry and are designed to carry drugs safely tumors without harming organs and healthy tissue. But in spite of commitment to safety, doubts remain. Many environmental groups are calling for a tightened regulatory framework where nanomaterials are concerned

At present, the advantages outweigh the potential risk, but industry and legislators are determined to ensure that nanotechnology brings benefits and a brighter global future

# POLY METALLIC NODULES

SRIRAM.V
Batch 2012

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India's population explosion and gradual exhaustion of land resources have made the nation's researchers to look out for potential resources in the sea. The National Institute of Ocean Technology, which is situated in Chennai, has collaborated with foreign research institutes and facilities to mine poly-metallic nodules from the Central Indian Ocean region. India became a pioneer investor in deep sea mining as the International Sea Bed Authority (ISBA) gave this region to India for exclusive research and exploitation in 1987.

Poly-metallic nodules, prominently represented by manganese nodules, are globular mineral concentrations found on and just under the seabed in oceans worldwide. They also contain various minerals such as cobalt, nickel, iron, copper, lead, molybdenum, titanium, vanadium and cadmium. They are irregular in shape and are thus sometimes known as potato ores. Similar to the formation of pearls the nodules need a nucleus to form, like a piece of debris, around which the mineral particles from various sources settle to form a lump of up to eight inches in diameter. The process takes millions of years. It is believed that if the project of mining these modules becomes a success, it can satisfy our mineral needs for many more years to come.

# Tête-à-tête

- Monica Roy.
Adhithya Butt,
Gautham Kumar
Batch 2014

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Just out of college and full of energy 26 year old Nikhil Patil talks with us about his fun and frolic days in NITT, his experience with TKR sir, his current job, choices, interests and much more…..

***Us-*** *Well, first of all, we would like to know which institute and stream did you pursue your bachelors from and what was your field of interest for the Masters course?*
*"I did my bachelors from Vishwakarma Institute of Technology which is affiliated to University of Pune in Instrumentation and Control Engineering (ICE). After that I worked for the Emerson Process Management in Pune for couple of years and then I did my masters in Process control and Instrumentation from our college. Now I am working with L&T in Mumbai."*

***Us-****Could you tell us about your stint at NITT, how you found the college and place to be? How was your college life?*
*"The two years at NITT, I enjoyed thoroughly. Basically it was for the first time I was staying away from home and initial few days were difficult to adjust the main reason was food. But it was only till we found some good eateries in the nearby area. First year of the course was routine and kind of monotonous as we have to attend lectures, practicals, assignments etc. Second year was more fun. We had project work and along with that we had to conduct labs and assist professors in CTs invigilation and other stuff. During 2nd yr. we got lot of time for the things other than the usual project work and I spent most of it with friends on the ground playing cricket, badminton or volleyball. Favorite time pass spots for any NITTian are Buhari and the juice center and we were not different. I still wonder how that juicewali akka manages to serve the juices at such cheap rate. I've never had satukudi juice at just Rs 10 before coming to NITT. Watching movies with friends, going for trips, placement parties, all these memories are still fresh in my mind."*

*Us- Dr. T.K Radhakrishnan being a strict disciplinarian, we would like you to share your learning experience under his coveted guidance. How was it?*

*"TKR sir is one of the most influencing professors I have ever met. I still remember the concepts what he taught us in his first class of Advance Process Control two years back. What I like most in his classes is his structured, systematic and disciplined way of teaching. He is a wonderful orator and a great mentor; and always cares for students. Working under his guidance for my Master's thesis was a privilege. I would like to take this opportunity to thank him for being such a great mentor. I really enjoyed being in his classes and working under his guidance. His vast experience in the field of process control and great teaching skills makes him one of the best professors we have at NITT. His penchant for discipline and punctuality keeps students on their toes always or on lighter note I would say you can easily guess which professor is having first 8:30 ka lecture by just looking at the rush to reach the class."*

*Us- You did your bachelor's in I.C.E and chose process instrumentation and control as a subject for your master's degree. Well, that's not a commonly observed trend? What made you go for this shift?*

*"First of all, process instrumentation and control is not a totally new field for an ICE engineer and it is very well in line with the subjects studied in the bachelor's degree. Control system is my favorite subject and while working with Emerson which works in the fields of Process Automation and Instrumentation globally, I got a chance to work in the field of process control and my interest in the field of Process automation grew further. This helped me to decide process control and instrumentation as a subject for my master's degree."*

*Us-After executing this shift you now work at L&T which is basically a civil company. What is the nature of your job now? Do you really feel that the purpose of making this shift has been served fruitfully?*

*"L&T is not a civil company only; infrastructure is just one part of it. Along with it L&T works in the field of Oil and Gas industry, Electrical and Automation, Power generation and transmission, Heavy engineering etc. I work as a control system engineer in the Defense Technology Development Center of L&T and the knowledge acquired in the field of mathematical modeling and control system during my Masters definitely helps me in this field."*

*Us-According to you, what is the possibility of future success for people who have taken similar decisions in their career in the context of job opportunity and job growth? In what way do you feel the two are related?*

*"Control system engineering is an exciting field to apply your engineering talent, because it cuts across numerous disciplines. Many engineers are engaged in only one area, such as circuit design or software development etc. however, as a control system engineer, I find myself working in a broad area and interacting with people from numerous branches of engineering and sciences. For example, the project on which I am working right now is basically design and development of the Missile Launcher for the one of the missiles developed by DRDL. I am involved in the project as a control system engineer and had to interact with colleagues in mechanical engineering, electrical engineering and electronics engineering. The design level involves hardware selections like sensors and motors to be used to meet the required specifications.*

*Then electromechanical modeling of the system using MATLAB is done to study the performance of the controller designed under different conditions. This involves lots of inputs from the mechanical as well as drives group. Currently the final integration of the system is going on and I am doing the tuning of the controllers for achieving desired positional accuracies. So in short according to me control engineering is an exciting field with lots of job opportunities and growth."*

*Us-How challenging it was for you, given that you did your bachelors in one stream and masters in another? How did you cope up with that? Would you like to give a word of advice for those who intend to do the same?*

*"Process control and Instrumentation is an interdisciplinary course and provides a common ground for the EEE engineers, instrumentation engineers and chemical engineers. One can find studying few Chemical Engineering subjects difficult if you are from the ICE background but same is the case for the Chemical Engineering when it comes to ICE subject. So you have to learn them with the help of your classmates and friends from the other discipline and that is the best part of it. It is a very well designed and coordinated course between chemical and instrumentation department and very few good colleges in India offer Masters in this subject."*

*Us-These days the pressure from society, family and peer groups is increasing so much that one is forced to live a life that differs from his passions, choices and instincts. Owing to such pressures and other external compulsions, sometimes one has to stray away from one's own internal desires and interests and choose something which does not come to him naturally. What's your take on this?*

*"Oh My God! After all these questions from you now I have started feeling like I have done something great by doing my masters in*

*PCI (He smiles with a wink!). According to me the pressure from society, family and all is always going to be there but what is in your hand is if you have passion for a particular thing you should go ahead and pursue it. There are many things in life that will catch your eye but only few things will catch your heart, pursue those."*

*Us- You did a German A1 course with us and topped the batch from NITT. We would like to know about your passion for the language.*
*"(Laughs) Topper of NITT batch! Do you know how many appeared for the test???I chose to study German because of my interest in the field of automation and Germany being one of the leading countries in the field. While working with Emerson I got chance to work with the German customers and made some good friends while working with them and that further inspired me to learn the language."*

*Us-Having served the industry for quite some time now, I would like you to throw some light on the various qualities and attributes needed to sustain in this field as it will be really helpful for the upcoming engineers from your alma-mater.*
*"Hard work, good communication skill and teamwork are the qualities for which there is no alternative. Along with these qualities one needs to be good at social networking i.e. formal and informal interactions and bonding with your colleagues across the departments which will help you to get your work done faster. Patience is one more quality one needs to develop in order to sustain in any field. I feel patience is the best remedy for every trouble."*

*Us-What are your future plans?*
*"I'm not thinking too far as of now. Just started working in this field of defense technology and would like to explore it more."*
And saying so he signs off with an enthusiastic smile. Our CHEA Team wishes him all the best for his future endeavors!!!

# MY SUMMER INTERNSHIP

## -Pronoy Das Batch 2013

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For most of the chemical engineering students around the world it's a dream doing an internship in Dow Chemicals and I would say I am lucky enough to have got this opportunity courtesy our beloved college NITT. The Best part about my internship here in Dow is that I don't need to go to a plant but instead learn about designing plants in an air conditioned office. It is called India Engineering Centre (IEC). The main work of this centre is to help design plants of Dow around the world , provide onsite support and engineering solutions. Chemical Engineers work in the discipline called Process Engineering. Any project starts here with process engineering ( atleast we are ahead somewhere).

Talking about my work here, I have been given a task to design a flash drum which is going to be installed in an Ethylene Oxide plant in Terneuzen, Netherlands. Though it's a bit tough for me as It is a totally new thing, the people here are very helpful and friendly and they guide me through the step by step process which I need to follow for this project. I have regular meetings with engineers in Netherlands for getting inputs on this project.I have been provided with a laptop to work. Also, I have been given access to softwares like Aspen which I am using to simulate the process which is taking place inside the flash drum. They are also a number of calculation tools available in excel which makes your calculation work short. I also need to do the documentation work which is required for any process engineering task for e.g safety checks, protection analysis, requirement of safety valves, equipment datasheets etc. This project has given me an insight how fluid mechanics and mass transfer is applied in industries.

I was a bit surprised to see people still consulting books like Treybal, Coulson and Richardson, Kern ,McCabe and Smith and understood their importance even though we hardly refer to them in our college.

In short I would say this internship has provided me with a short glimpse of the important role chemical engineers play in designing chemical plants and what my life is going to be one year from now.