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2017 ITDI 5th Cluster Techno Offering

Nanotech takes center stage

Nanoscience and its end product – nanotechnology - has often been called the "science of small."

Whence this description comes from actually refers to the ways current researchers manipulate materials in order to come up with a product – the traditional top-down method and the new common of bottom-up approach.

Traditionalists use the top-down method to produce cutting-edge forms by continuously chipping and removing pieces from a "large material." Here, they fashion a product much like a sculpture is formed out of a big stone. The method uses much energy, releases toxic chemicals, and generates much wastes.

On the other hand, today's researchers use the bottom-up approach where, like playing with Lego, they pick and connect desired shapes one by one until they get the desired form and function. This approach is achieved by molecular assembly techniques.

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Richard Feynman, an American theoretical physicist, described as early as 1959, the process by which future scientists would manipulate and control individual atoms of a molecule -- the stage where nano research begins.

How small is nano small?

Nano as a unit of measurement of length is comparable to similar units like meter.

Going to the colorful side of describing the scale of things, the nano way, rather at nano size, do you know that ONE NANOMETER is about as long as your fingernail grows in one second? Still cannot imagine how "big" one nanometer is, then, try this. A human hair is approximately 80,000 - 100,000 nanometers wide!

Now, THAT IS SMALL.

Coining of the term nanotechnology, however, started in 1974 – 15 years after research on materials at nano size began. Today, nanotechnology research mainly consists of the process of separation, consolidation, and re-development of materials by one atom or one molecule.

A Pinoy NanoLab opens for *Juan* techies

At the Industrial Technology Development Institute (ITDI-DOST), the country's first NanoLab is one of the youngest of service units providing technical services to local industries.

It first opened to the public on July 1, 2015 for *Juan* techies to personally appreciate the look and feel of nano products.

First introduced in 2012 by former Science Secretary Mario Go Montejo, NanoLab is one of the very few public nanotechnology research laboratories in the country.

It offers world-class equipment and devices meant to provide nanotechnology-related technical services. By developing materials with structure at the nanoscale, researchers can explore their unique optical, electronic, or mechanical properties.

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NanoLab is currently housed at the Materials Science Division (MSD-ITDI) building located at the DOST Complex in Taguig City.

Here, a high resolution field emission transmission electron microscope (FE-TEM) with high resolution STEM imaging and Energy Dispersive X-ray Spectroscopy (EDS) can be found, a first in the Philippines. FE-TEM can magnify materials up to 1.5 million times and is capable of rapid data acquisition.

There are 10 other high-level machines and gadgets that MSD researchers use to undertake R&D studies on materials science and engineering, including collaborative work and provision of technical assistance to the industry and academe.

Whipping up the cool in nanotech

Our biological systems abound in a variety of nanomaterials.

Some foreign and very creative researchers may have in fact used some of these in their studies -- butterfly wing scales, even horny materials from birds and animals such as skin, claws, beaks, feathers, horns, and hair.

Would you believe that even our own bones are all-natural, organic nanomaterials?

At NanoLab, the fearlessly curious may find a variety of sources of nanomaterials, often natural and functional. The Lab has, however, decided to rely on what are abundant, unexploited, and natural organic or inorganic nanomaterials found in the Philippines' countryside.

You may be surprised at just how seemingly ordinary, dull, and everyday materials can be redeveloped into cool nanotech.

So compare your everywhere, everyday materials like nanoclay from the Bicol Region; cassava and corn starch from your local supplier; zeolite from Pangasinan; silica or quartz from Camarines Sur; natural rubber and halloysite from Mindanao; and calcium carbonate, a substance found in rocks.

Now see what are on our selling table made from nanoclay sourced from our local bentonite ore in the Bicol Region:

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1. Biodegradable nanocomposite films, a new take on green food packaging and cutleries;
2. Halloysite nanoclay-filled epoxy molding compound for integrated circuit (IC) (ICs are used in virtually all electronic equipment) or microchip packaging, to allow easy handling and assembly onto printed circuit boards and to protect these from damage and moisture;
3. Recycled polycarbonate-layered silicate nanocomposites (PLSN), as filler in nanocomposites to significantly improve composite properties such as enhanced mechanical strength, gas impermeability, thermal stability, and flame retardancy, among others;
4. Local bioactive polymer nanofribrous scaffold for human tissue engineering; and
5. Nanostructure fibrous membrane for wastewater treatment.

Certainly, these are innovations which are nothing but common. They are not only cool but effective as well.

But, there are a lot more, however, that one may find as thought-provoking at the 2017 ITDI 5th Cluster Techno Offering event featuring advanced technologies to be held on February 15, 2018 at the FNRI Auditorium, DOST Complex in Taguig City – more than nanoresearch, in fact.

On Thursday, nearly 200 industry members of the industry, research, and academe will be treated to a presentation of three nanotechnologies for licensing or for adoption through training.

The 2017 ITDI Technology Offering, a five-part technology pitching series began on October 12, 2017, aimed to offer industries on food processing, health and wellness, green engineering, and advanced technologies alternative processes as a way to shake up their businesses. (AMGuevarra\\ ITDI S&T Media Service)

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