

# TECHNO Bulletin

The official newsletter of the Industrial Technology Development Institute published semi-annually

## Science head reveals 200 new FIC products FPD champions agri-food trade

*“This is indeed a lucky day for us. It is truly exciting to see this spread of new food prototypes for our project on 200 by 2000 Prototypes of Product Concepts.”*

This from Science Secretary Mario Go Montejo as he, together with other DOST executives, led the soft launch on February 15, 2016 by the Food Processing Division of an initial 63 product prototypes developed from 1,016 product concepts.

In a jubilant mood, Secretary Montejo congratulated ITDI Director Maria Patricia V. Azanza adding, *“We overshot by 125 percent our end goal of developing at least 50 product prototypes and more than doubled our target of 500 product concepts using the water retort. Truly impressive.”*

### Underpinning food technologies at FICs

The Food Processing Division (FPD) developed the first batch of prototypes using the water retort. As one of four machines featured by DOST under the *“Roll-out of DOST-developed Food Processing Equipment to the Regions”* project, the water retort processes food through pasteurization and sterilization.

Pasteurization is a mild form of heat treatment to inactivate enzymes and kill relatively heat-sensitive microorganisms. On the other hand, sterilization is the complete destruction or elimination of all viable organisms in a food product.

Other machines include the spray dryer, which transforms liquid products to powder instantaneously; vacuum fryer, which fries food at lower pressure and temperature than conventional frying; and freeze dryer, which completely removes water from food, while preserving the food’s structure and composition.

Director Azanza explained that *“DOST initiated the establishment*



## ITDI research information transfer highly improving



The Information and Documentation Section (IDS) of the Technological Services Division of ITDI as the

communication arm of the Institute recently noted a significant surge in the transfer of research information.

Efforts of hard working researchers, once missed by print and broadcast media, are now enjoying more attention, not only by print and broadcast practitioners but by social media, radio and TV as well.

Reports show that in 2014, there were about 64 published releases in printed newspapers (23) and online (41), or a monthly average of five. As well, seven stations broadcasted nine radio interviews. *“We are thankful that ITDI’s efforts are now getting the attention of our media friends,”* IDS head, Violeta B. Conoza said.

Attributing the boost to active engagement of all IDS staffs, Conoza noted that news publication increased in 2015 from 64 to 102,



# EDITORIAL

How should one work to advance the system of creating entrepreneurial wealth?

At the Association of University Technology Managers, they believe that “*Industry needs disruptive technology and really expert technical people, which can come from universities or other entities...*”

But that “*You can become so entrenched in your university ... It’s important to be able to talk about issues and benchmark what others are doing and see how problems are solved. It’s amazing how many solutions you can come up with when you work together.*”

In the Philippines, much work needs to be done for national research and development institutes to join hands with the academe in a concerted effort.

Currently, the Global Commercialization Group (GCG) of the Innovation - Creativity - Capital (IC<sup>2</sup>) Institute of the University of Texas at Austin has collaborated with the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD).

GCG meant to provide PCIEERD’s network of 17 technology transfer officers and three Technology Business Incubators a technology commercialization capacity-building program.

So what does the seven-month program aspire to accomplish?

With Marten Davies as lead, GCG aspired to advance the capabilities and know-how of the Filipino technology transfer ecosystem through an initial evaluation of the ecosystem. This was followed by training and mentoring, in both Austin and the Philippines, of senior managers of each of the 13 institutions. Lorelle Barracol and Cristina B. Candelaria of TSD-ITDI were joined by representatives of nine other DOST line agencies, namely, TAPI PCIEERD, FNRI, FPRDI, PCAARRD, PCHRD, PNRI, PTRI, and MIRDC.

Davies’ view is to drive long-term economic and industrial development through innovation in the Philippines. But, the ultimate questions right now are these. How can entrepreneurs advance a specific kind of technology claim? What is the value proposition? In addition, technology innovators like ITDI must pitch its technology and its business value to potential buyers, partners, and distributors and make claims as well. Where do these lines meet and merge?

## Science head... *from p. 1*

*of FICs nationwide. ITDI as the FIC-Main functions as overseer of the regional FICs.”* It currently serves as a facility for product prototyping as well as a source of expert assistance in food regulatory requirements compliance.

Nine regional FICs are presently housed in academic institutions that offer food science and/or related courses “*to enable our MSMEs to take advantage of their research capability,*” she added.

### **200 by 2000 - Prototyping Product Concepts**

“*What we are doing is development of new product lines. Our approach is integrative,*” Director Azanza said. She adjoined that FPD is targeting to develop 50 prototypes from 500 product concepts or 200 by 2,000 using the four machines.

The 63 newly disclosed product prototypes and 953 product concepts include variants “*differentiated by raw material cultivars, maturity, added flavors, and packaging types and sizes.*”

### **Sweet and Savory Rice-based Products**

To elaborate, FPD developed 674 product concepts for healthy, rice-based drinks and shakes, and Ready-To-Eat sweet and savory rice porridges.

Four rice cultivars, namely, black, red, brown, and Sung-Sung rice served as base for 26 variants of rice milk shakes and drinks. Additional rice milk and shake variants were developed using natural flavor infusions.

Not wanting to waste the rice starch by-product from rice shake and drink production, the division’s

team branched out. Thus 26 product concepts on Ready-To-Eat sweet and savory porridges resulted. Available in convenient stand-up packs, their long shelf-life make these suitable as emergency rations.

Sweet porridges are available in the form of *chamorado* and *ginataan*. *Ginataan* variants include yellow and white corn and green, yellow, and red mungo.

Savory congee lists two *goto* variants, namely, plain tripe and tripe with calamansi and fish sauce. On the other hand, *arroz caldo* is available in four variants, including plain duck meat and plain quail meat. Also available are duck meat, duck meat with calamansi and fish sauce, plain quail meat, and quail meat with calamansi and fish sauce.

## DOST-ITDI study says

# Oil spill reversal possible with shrimp composite

A new green, reversing technology to remediate oil spills on fresh and marine waters is being explored by the Environmental and Biotechnology Division (EBD).

Led by Dr. Emelda A. Ongo, her five-member team has developed a mixture of chitosan (a by-product of chitin [pronounced as /`kaɪ.tɪn/] from shells of shrimp, crab, or lobster) from shrimp and calcium carbonate for use as biosorbent to remove petroleum spills from water.

*“Largely dismissed by some as a problem that ‘will go away in time’ what is alarming in oil spills is that the damage it causes is permanent and takes quite a while to clean up,”* Ongo explained.

As is its natural characteristic, oil spills float on water and prevent sunlight from passing through it. This makes it difficult for plants and sea animals to survive. A coating of oil can kill seabirds, mammals, shellfish, and other organisms.

Ongo clarified, *“We now know that it affects seabirds and other mammals because petroleum can penetrate into the structure of feathers and fur breaking down their insulating capability. This makes them vulnerable to temperature fluctuations; most commonly die from hypothermia.”*

In addition, oil that washes into coastal marshes, mangroves and other wetlands also coats rocks and sands thus making the area unsuitable as plant and animal habitats. Those that sink into the mangrove environment can

damage fragile underwater ecosystem killing fishes and fish eggs, among others.

### Everyday materials, new green results

Chitosan has long been used as a biopesticide. Its other uses however for medical and industrial purposes have been increasingly receiving attention in research circles. Of particular interest is its industrial use as sorbent material for oil removal in water.

*“There are other organic and inorganic materials which may do as well. It is indeed amusing to know that our everyday shrimp and egg have found themselves on our lab tables,”* Ongo said.

*“Let me explain. While most have been using pure chitosan as sorbent material, we have chosen to work on chitosan, which come from shrimp shells, and calcium carbonate from eggshells. Why? Because these are waste materials that can be re-used, are cheap, and widely available. In addition, their biocompatibility, biodegradability, and safety make for an ideal composite. Chitosan, of course, has film-forming ability while surface roughness in calcium carbonate make them excellent sorbent materials,”* Ongo explained.

She added that *“... with oil spills, cleaning up is a great challenge.”*

Lack of technology and expertise, as well as, great financial demands of the task, including factors such as amount and type of oil spilled, water temperature (which affects rate of evaporation

and biodegradation), and type of shorelines and beaches can sorely test concerned groups

However, what reassured her team was that they were able to show that a 50:50 composite of chitosan and calcium carbonate in flakes and granular forms works. Ongo described how *“... we modified calcium carbonate into being super hydrophobic and oleophilic. Simply, we wanted to develop a material that has a strong affinity for oils rather than water.”*

Combining chitosan with calcium carbonate thus dramatically increased adsorption capacity of the green technology.

Which then of the composite flakes and composite granules tested better?

Testing the composites using a 5000 ppm (parts per million) concentration of diesel oil and bunker fuel oil in synthetic wastewater *“... was a relief because they showed satisfactory results,”* Ongo related. Both scored a removal rate of 99.9 percent in the oil and grease test including a final concentration average of 4 ppm for composite granules and 5 ppm for composite flakes.

Not content the team also conducted a Total Petroleum Hydrocarbon (TPH) analysis. Using a 1,000 ppm concentration of diesel oil in synthetic wastewater, both composites reduced TPH rate by more than 99 percent; TPH concentration was reduced to 2 ppm.

Ongo added that, *“We also tested*



## Science head... *from p. 2*

### Chili in Oil

FPD developed 342 product concepts of chili in oil, hot sauce, and chili paste from red and green *siling labuyo* (*Capsicum frutescens*).

Variants stemmed from infusions of the red chili oil and green chili oil with dried anchovy, garlic, onion, *bagoong balayan*, *bagoong alamang* and ginger.

“Thus far, we are very satisfied with the turnout of our initial product presentation,” Director Azanza ended adding that the next product presentations will be concepts and prototypes from all four DOST-developed equipment.

### Continued FIC Promotion

In this regard, FPD made a full presentation of the final 228 product prototypes developed from more than 11,000 product concepts on April 12 at Casa Buena de Pulilan in Pulilan, Bulacan. FIC-Main developed 71 prototypes using the water retort,



61 using the vacuum fryer, 61 using the spray dryer, and 35 using the freeze dryer.

This was followed by a national launch before more than 300 guests on April 27 during the 1st DOST Technology Transfer Day held at Sofitel Philippine Plaza Manila. *(Adelia M. Guevarra)*

## ITDI research... *from p. 1*

or a monthly average of 9 releases. Of these, some 79 releases can be found online and 23 in the traditional printed newspapers. Interviews over the radio also increased by 89 percent, with 17 aired in 7 stations. In addition, 11 live television interviews were telecasted in 3 major TV networks over 7 daily programs.

This year news publication finds an early lead in a monthly average of 11 releases, up by 22 percent from 2015; online news reign high at 43 releases and 12 for printed newspapers.

As well, radio interviews record a nice 10 in the first half of the year while ITDI project heads figured in five live television interviews over DOSTv, the new Filipino Weather Channel, which airs globally via

<http://www.dostv.ph>. Launched on May 30 this year, DOSTv is currently enjoying a record of 3,751 hits 15 days after airing its first episode.

In addition, our online presence, which initially featured the ITDI Website, has been increased to include a Facebook and YouTube accounts. A report on website activities showed that ITDI tallied 1,890 hits monthly in 2014. This increased to 2,285 in 2015 and is currently at 2,461 hits.

Some 21 videos have been uploaded over YouTube, currently totaling 21,000 views. The top four most viewed videos include:

1. OL Trap Instructional Video of the Chemicals and Energy Division - 11,530 views;
2. Loopwing Wind Power Generator

Demo Project (Philippines) of the Environment and Biotechnology Division - 3,647 views;

3. Calamansi Processing of the Food Processing Division - 2,284 views; and
4. Mosquito Ovicidal Larvicidal Trap Demo ni Dr. Nuna Almanzor of DOST-ITDI - 1,763 views.

This report suggests a trend being exhibited by these news outlets. This is corroborated by Nic Newman in his Reuters Institute Digital News Report 2015 where he cited that globally, television (43%) remains as the main source of news in most markets, followed by online (including social media, 38%). There is also a declining trend in the use of traditional newspapers (8%) as source of news.” *(Adelia M. Guevarra)*

## Oil spill... *from p. 2*

173 ppm concentration of bunker fuel oil in synthetic wastewater to determine its TPH concentration. Composite granules reduced

concentration to an average of 1.4 ppm while composite flakes reduced it to 2.9 ppm.”

If at all, determination of the maximum capacity of the

composite to adsorb oil added substance to their findings.

The team reduced the “... hit or miss calculation to come up with the composite quantity required

# More anti-oxidizing health supplements developed by ITDI

Natural antioxidants have since been touted by health buffs as the body's defense against cell damage because of free radicals, which develop due to oxidative stress or OS.

However, with a new health supplement from locally grown fruits, vegetables, and spices, OS may soon be an easy fix.

A team of researchers of the Chemicals and Energy Division (CED) developed two dietary supplements in three easy to take forms - chewable table, capsule, and syrup.

Dr. Rosalinda C. Torres, head of the pharmaceuticals section of CED, explained "... *insufficient levels of antioxidants, or inhibition of the antioxidant enzymes, cause OS and may damage or kill cells.*" It is widely believed to contribute to the development of a wide range of diseases such as Alzheimer's, Parkinson's disease or PD, diabetes, and rheumatoid arthritis.

As well, OS is causative of nerve aging in motor neuron diseases, namely, amyotrophic lateral sclerosis or ALS, primary lateral sclerosis, progressive muscular atrophy, progressive bulbar palsy, and pseudobulbar palsy.

The most common antioxidants are vitamins A, C, and E, beta-carotene, selenium, and lycopene. These are present in bright-colored fruits and foods like cherries, carrots, and blueberries.

"We thus undertook this study to develop a natural-based antioxidant health product in the form of chewable tablet, capsule, and syrup that contains a combination of at least three plant materials that exhibited the most promising antioxidant activity," she added.



Based on this, 7 fruits (*bignay, duhat, guyabano, mango, mangosteen, rambutan, and strawberry*), 3 vegetables (*alugbati, ashitaba, and eggplant*), and 3 spices (*batuan, lemongrass, and turmeric*) were processed according to the 1998 Manual on the ICS-UNIDO Training on Quality Control of Medicinal and

Aromatic Plants and Their Products.

Torres and her group, composed of Carmelita O. Manalo, Evelyn B. Manongsong, Elvira L. Arrogante, Romulo R. Estrella, Eduardo A. Lanto, and Dr. Annabelle V. Briones, worked to establish the most efficacious combination that can provide high levels of antioxidant and scavenging activity (or the removal or de-activation of impurities and unwanted reaction products).

With care, they established levels of safety, purity, and efficacy of the 13 materials. Presence of heavy metals such as lead, cadmium, and arsenic, and microbial contamination were determined. In addition, they checked for the plant materials' individual rate of anti-oxidizing activity.

To do this, "*We subjected the materials to water solution extraction followed by spray-drying and alcoholic extraction. Afterwards, we combined three plant extracts and formulated these into dosage forms such as chewable tablet, capsule, and syrup,*" Torres related.

As a cautionary measure, the group re-tested product efficacy, safety, and purity of the combined forms. Product analysis and stability tests were also undertaken.

"Results on all plant materials have been promising. However, the combination of 223 mg/k concentration



## DOST-ITDI Technologies now ready for transfer



DOST's Industrial Technology Development Institute (ITDI) announces that the following

technologies are now ready for transfer:

1. ITDI *Monascus purpureus* whole cell laboratory scale color production technology

The technology uses two improved techniques to produce food colors, one using rice substrate and another, using aqueous media with heat and moisture modified starch.

Color from the rice substrate may be extracted with ethanol followed by solvent evaporation while color from the aqueous media may be spray-dried to obtain color in powder form. Both mutants did not exhibit activity against bacteria which implies low level of citrinin.

The technology is developed by the Industrial Fermentation Section under the Environment and Biotechnology Division of ITDI.





## DOST-ITDI:... *from p. 5*

### 2. Freeze-dried avocado using the DOST-developed freeze dryer

Freeze-drying preserves the nutrients, color, aroma and flavor of the product by means of sublimation, a mild dehydration process.



Advantages/characteristics of freeze-dried avocado:

- Requires no preservatives
- Healthy and nutritious
- Preserved aesthetic, functional, nutritional, and organoleptic properties
- Stable material structure
- Improved product stability during storage
- Good re-hydration characteristics



### 3. Powdered cucumber using the DOST-developed spray dryer

Cucumber (*Cucumis sativus* L) is widely utilized in various dishes for its fresh and pleasant green note or plant-like flavor; examples include potato chips, biscuits

and in pasta sauce as flavorant. To limit the degradation or loss of flavor from the cucumber, the ITDI-DOST employed the process of microencapsulation by spray drying using the DOST-developed spray dryer.



Advantages/Characteristics of powdered cucumber:

- Very stable; the powdered cucumber has a shelf life of over a year (under ideal storage conditions)
- Convenient to use; easy to apply in food products which require the pleasant green note of cucumber
- Does not require refrigeration
- Easier to handle/ transport due to reduced volume



### 4. Carrot chips using DOST-developed vacuum fryer

Vacuum frying preserves the nutrients of foods by enabling deep-fat frying in lower temperatures and pressure as compared to conventional frying.

Advantages/characteristics of vacuum-fried carrots:

- High quality since there is minimal loss of properties (e.g., color, flavor, nutrients)
- Reduced fat absorption
- Contains less oil than conventionally fried carrots
- Requires no preservatives
- Crispy
- Healthy and nutritious



### 5. Chili in oil using DOST-developed water retort



ITDI's FIC-Main developed chili in oil products from *siling labuyo* using the DOST-developed water retort. The resulting oils are ideal

## DOST-ITDI:... *from p. 6*

for viands, chips, and even crackers. The chili oils come in various flavors such as onion, garlic, ginger, dried anchovy, shrimp paste and anchovy paste.

Advantages/characteristics of chili oils:

- Stimulates appetite
- Shelf-stable
- Requires no sophisticated equipment
- Uses locally available raw materials



## 6. Emergency Food Reserve (EFR): Sagip Nutri-Powder



Sagip nutri-powder is made from choice crops like cassava, camote, malunggay, and monggo. It is an energy food that is both nutritious and filling.



Advantages/characteristics of Sagip Nutri-Flour

- Ready-to-use powder, needs no cooking/heating; just add water to eat

- Provides immediate relief from hunger
- It can be stock-piled and incorporated into various food preparations (e.g., chocolate nutri-bars, polvoron, EFR breads, soup, kutsinta, puto, bibingka, and ukoy).

## 7. Mango flakes



Mango flakes are drum-dried fresh mangoes (Carabao variety) at its optimum maturity (rare ripe with peel color of 80 percent yellow and 20 percent green), with firm texture. Drum drying is a continuous, indirect drying method that allows short retention time while evaporating all the liquid in the product within a single rotation of the drums.

Advantages/characteristics of drum drying/mango flakes:

- Reduces risk of degradation of the product during storage
- Maintains product's unique properties like taste, color, odor, and texture
- Shelf-stable
- Drum-dried fruits like mango flakes are widely used in food manufacturing (e.g., confectionery, baking, sweets, infant foods, and sauces and soups)



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## More anti-... *from p. 5*

*of mangosteen, rambutan, and strawberry in chewable tablet showed a scavenging activity rate of 88 percent," she reported.*

Nevertheless, the group found that by replacing strawberry with *bignay* (an indigenous sour berry) in the combination and increasing concentration to 232 mg/k, scavenging activity rate can rise to 90 percent.

There are other plant combinations, which still need to be studied. Soon, other combinations may yield results that are more effective.

For the moment, Torres is satisfied that her group was able to develop two formulations now available as well in capsule and syrup. (*Adelia M. Guevarra*)

## Oil spill... *from p. 4*

*to address an oil spill volume. We are thus effectively saying that one gram of adsorbent can adsorb a maximum of 4.9 grams of oil."*

Clearly everyday materials are presenting new and exciting prospects to better address various needs. For now, Ongo and her team are battling for this green reversal technology for oil spills. (*Adelia M. Guevarra*)



## Maryness Ildefonso Salazar Master of Science in Measurement Science



*A Metrology R&D Scientist, with Calibration and Measurement Technologies Specialization*

*A graduate of Master of Science in Measurement Science, with proven and recognized capability in Quality Management System and Technical requirements in accordance to International Standards*

*Post-baccalaureate Diploma in Mathematics Open University – University of the Philippines Los Baños*

*A graduate of Bachelor of Science in Applied Physics (Major in Instrumentation, University of the Philippines Los Baños)*

Ms. Maryness I. Salazar, fondly called “Nhet” by friends and colleagues is no ordinary lady.

Early this year, she earned her degree in Master of Science in Measurement Science at the Korea University of Science and Technology (UST), Korea Research Institute of Standards and Science (KRISS) Campus. This has levelled up her capability in Metrology and Quality Management System that conforms to International Standards. It is also worth noting that she’s the first Filipino graduate from UST and also the first to acquire this degree with specialization in the field of Metrology.

She is an Applied Physicist, a post equivalent to an Engineering Manager. Professionally trained and experienced, she has more than 10 years in the National Metrology Laboratory of ITDI, the designated national metrology institute of the Philippines.

Ms. Salazar is presently a Science Research Specialist II and the Section Head of the Pressure and Standards Section, an ISO 17025 accredited laboratory of the National Metrology Division. Here, she is responsible for the maintenance and calibration of reference standards of highest accuracy in the country as well as ensuring delivery of quality metrology services to customers of the laboratory.

As deputy quality manager, she is responsible for maintaining and implementing the quality system of the whole laboratory.

For someone so young, her qualifications as a metrology scientist are humbling. Her all valuable achievements are too numerous to count. The most recent and notable, however, are as follows:

- Implemented and maintains a quality system in accordance with ISO 17025;
- A technical assessor of the Philippine Accreditation Bureau, performs technical assessment for local calibration laboratories seeking ISO accreditation;
- Established the Pressure Standards Section as a competent and reputable laboratory capable of providing metrology

- and consultancy services and source of resource speakers for metrology trainings; and
- Provides technical expertise for measurement inter-
- comparison locally and internationally, to assure quality of measurement results specifically in pressure metrology.

Aside from supervising the pressure and standards section, she also conducts and attends training/seminars and technical presentation here and abroad. Some of those, which she has conducted include:

- A technical presentation on the Performance Characterizations of Commercial Capacitance Diaphragm Gauges using Force-balanced Piston Gauge during the Asia-Pacific Symposium on Measurement of Mass, Force and Torque (APMF 2015) held on October 27, 2015;
- A poster presentation on her study on Performance Characterizations of Commercial Capacitance Diaphragm Gauges using Force-balanced Piston Gauge during the 48th Annual Conference of Korean Vacuum Society - Korea held on February 9 - 11, 2015; and an
- Annual training on Introduction to Pressure Metrology and Calibration of Pressure Gauges held at the Metrology Training Center of NML-ITDI from 2009 to 2013.

She has attended several international trainings/seminars. Below are those she has attended from 2013 to 2015:

- Research mission at the National Institute of Standard and Technology in Gaithersburg, Maryland, USA;
- Asia-Pacific Symposium on Measurement of Mass, Force and Torque (APMF 2015) in Seoul, South Korea;
- International Metrology Symposium (IMS 2015) in the Korea Research Institute of Standards and Science in Daejeon, South Korea;
- 30th Asia Pacific Metrology Programme (APMP 2014) General Assembly and Related Meetings in Daejeon, South Korea;
- 7th APMP Pressure and Vacuum Workshop and UST - Sokendai Joint Seminar on Computational Sciences UST Headquarters in Daejeon, South Korea;
- The GUM and its Revision by Dr. Maurice Cox of NPL at the Korea Research Institute of Standards and Science in Daejeon, South Korea;
- Global Metrology Academy Course on Mass and Related Quantities at the Korea Research Institute of Standards and Science in Daejeon, South Korea; and the
- 29th APMP General Assembly and Related Meetings in Taipei, Taiwan.

Albeit fully-loaded, Nhet still finds time for her social life. She de-stresses by going on adventures with her circle of friends and admitted that she dances and sings but that these are not her cup of tea. She likes exercising Although her physique doesn’t show it off, her ticker benefits from it. Her intelligence we cannot discount. Her look, well, she is gorgeous. In fact, she is highly qualified for Miss ITDI Universe, being beautifully healthy with a heart! Meet her and you’ll find yourself mesmerized with her charm. *(Delia D. Gotis)*

### Our Business Is Industry



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