DOST-ITDI Develops Porous Nanocarriers for Drug Delivery Applications from Local Nanomaterials

The Industrial Technology Development Institute, one of the Research and Development (R&D) institutes of the Department of Science and Technology (DOST-ITDI), continues to expand its R&D efforts to help uplift local industries through improved productivity and boost the socioeconomic growth of the country.

In pursuit of this objective, one of the areas currently being explored by the institute is using local nanomaterials as nanocarriers for drug delivery.

What is a nanocarrier, and why use it for drug delivery?

A nanocarrier is a nanomaterial used as a transport module for another substance, such as a drug. These colloidal drug carrier systems typically have submicron particle sizes of <500 nm. Commonly used nanocarriers include micelles, polymers, carbon-based materials, liposomes, and other substances.

Drug delivery is the method or process of administering a pharmaceutical compound to achieve a therapeutic effect in humans or animals. For treating human diseases, nasal and pulmonary routes of drug delivery are gaining increasing importance.

Nanocarriers are useful in drug delivery because they can deliver drugs to site-specific targets, allowing drugs to be delivered in certain organs or cells but not in others. Site-specificity is a major therapeutic benefit as it prevents drugs from being delivered to the wrong places.

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Nanocarriers have shown great promise in the area of drug delivery and have been extensively investigated in the past few decades. At DOST-ITDI, its material science nanotechnology experts explored the potential of porous inorganic nanocarriers from indigenous nanomaterials useful in pharmaceutical drug delivery systems, particularly for anti-inflammatory drugs.

Two phases of R&D works were conducted, including the development, characterization, and optimization of parameters of the synthesized nanocarriers, laboratory production of nanocarriers, optimization of drug loading parameters, and the performance testing of the anti-inflammatory drug-loaded nanocarriers.

Likewise, rice hull was processed to synthesize nanosilica and characterized using X-ray fluorescence (XRF), X-ray diffraction (XRD), and dynamic light scattering (DLS) to determine chemical composition, mineral present, and particle size.

Studies are still being conducted in this area to fully leverage the promise of nanocarriers from indigenous materials for drug delivery, and, perhaps, explore their possible applications in other industries. *(DDGotis\ ITDI S&T Media Service)*