

Nano-Tech & products by academia & companies showcased at 11th Bengaluru INDIA Nano 2020

11th Bengaluru INDIA Nano conference and exhibition showcased technologies and products developed by academia and companies in nanotechnology.

The three-day event was organised by the Department of Science and Technology, Govt. of Karnataka and Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), in association with other Govt Institutions and corporate companies. JNCASR is an autonomous institution of the Department of Science and Technology, Government of India.

Research work related to novel approaches to tackle infections related to antimicrobial resistance, eco-friendly batteries, and tools on nanotechnology developed for agriculture were showcased by JNCASR at the exhibition, which was inaugurated by Dr. C. N. Ashwath Narayan, Deputy Chief Minister of Karnataka along with Prof. CNR Rao.

Some of the technologies exhibited included Rhino Lure and Rhyngo Lure, eco-friendly, cost-effective, and residual free control strategy tools to monitor and manage Rhinoceros Beetle and Red Palm Weevil pests and protect crops like coconut, date palm, oil palm, and areca nut. These technologies were developed by a team led by Prof. M. Eswarmorthy from JNCASR in collaboration with Dr. Kesavan Subaharan, ICAR-National Bureau of Agricultural Insect Resources, Bengaluru and Dr. Gautam Kaul M. from ICAR-National Dairy Research Institute, Karnal.



A set of eco-friendly batteries were also displayed. These had been developed by the team led by Prof. Tapas K. Maji from Chemistry and Physics of Materials Unit, JNCASR. The fabricated Zn-air battery uses Metal-Organic Framework (MOF) derived core-shell nanocomposite as a cathode material, which is trifunctional in nature, which means active for

ORR (Oxygen reduction reaction), OER (Oxygen evolution reaction) as well as HER (Hydrogen evolution reaction) catalytic reactions. The fabricated Zn-air battery is safe, lightweight, and is recharged electrically as well as mechanically. Along with this, to exploit the HER activity, the same material was used as anode and cathode in water electrolyser which is powered by the fabricated Zn-air battery and thus showing self-powered overall water splitting process.



RESEARCH @ INCASR

Controlled release dispenser for delivery of semiochemicals

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Introduction

Boer crop pests are a concern considering their cryptic nature

Insecticides use has ill effects on consumers and environment. Exploiting the ethology in insect management is a clean and green technology.

Pheromone is dispensed from rubber septa, capillary vials and polymer membrane sachets have high release rate. Hence, require frequent replacement.

Nanomaterials are effective in delivery of volatile signalling molecules.

Controlled delivery of semiochemicals loaded into nanomatrix causes enhanced efficacy over a spatio temporal scale.

Nanoporous matrix for delivery of pheromone

Nanoporous matrix for delivery of pheromone of palm weevils and beetles

Pheromone loaded in nanomatrix trapped higher number of beetles and weevils as compared to commercial lures.

Nanomatrix dispenser loaded with 150 mg pheromone was effective for 4-5 months as compared to commercial lure (400-700 mg) that was exhausted in three months.

Nanoporous matrix for delivery of pheromone of American tomato pin worm, *T. absoluta*

T. absoluta is an alien invasive to India and causes more than 80% damage.

Nanoporous matrix trapped over 950 moths per trap and superior over rubber septa that trapped 800 adults.

MOF Derived $\text{Co}_3\text{O}_4/\text{Co}/\text{NCNT}$ Nanocomposites as Trifunctional Electrocatalyst, Flexible Zinc-Air Batteries, and Overall Water Splitting

Prashant Singh and Tapas Kumar Mishra

Introduction

Synthesis and Characterization

ORR, OER and HER

Secondary Battery Application

Theoretical Calculations

FELLOWSHIPS & EXTENSION PROGRAMMES

ORIENTED BIOLOGY EDUCATION
ORIENTED CHEMISTRY EDUCATION

FELLOWSHIP PROGRAMME
FELLOWSHIPS FOR VETERINARY (VFP)

Faculty of Veterinary from Educational Institutions are invited to participate in these areas of research.

Research Fellowships: Rs 50,000/month