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IIT Roorkee

27.10.2021

To

The Chairperson (Award Committee)
Sun Pharma Science Foundation.

Subject: Nomination letter for Dr. P.Gopinath (Professor, IIT Roorkee) for the "Sun Pharma Science Foundation Research Awards – 2021".

Dear Sir/Madam,

I am glad to recommend Dr. P. Gopinath, for the "Sun Pharma Science Foundation Research Awards". I know the nominee since he joined IIT Roorkee in the year 2011. Dr.Gopinath had received several research grants (National & International) in the area of Nanobiotechnology. He is good at multidisciplinary research. His dedication to research is evident in his impressive record as detailed below and in his C.V. At present, he has more than **110 research publications (last ten years in India)** in the area of Nanobiotechnology in high impact factor journals. He has been a reviewer & editorial board member for many international journals. His research work has been well cited with **total citations of more than 4243** (h index 34; i10 index 80) till date. He has also published eight books and 15 book chapters. He has filed **ten patents and done one technology transfer**. His research articles published in *ACS Omega (2021), ACS applied biomaterials (2019), Biomaterials Science (2015), Journal of Materials Chemistry B (2015) and Journal of Applied Polymer Science (2015)* have been selected for the **cover page of the issue**. Many of his research works have been featured in **"nature INDIA"** and in **"ATLAS of Science"** and also in various national media's.

He has completed seven sponsored research projects so far and currently working on eight projects sponsored by various funding agencies like DBT, DST, etc., He is involved in collaborative projects with scientists from international institutions as well. Further, he has received several prestigious awards like "ILSI-India Young Scientist Award 2021", "AMI-Alembic Award-2020", "ICMR-prize for Biomedical Research-2019", "Shri. Om Prakash Sharma Award for a Young Scientist 2019 for outstanding contributions in Biomedical Research", "G.D.Naidu award for young scientist for the Year 2018", "Prof.H.S.Srivastava Foundation young scientist award". His credentials are very much impressive and outstanding. Based on his contribution at IIT Roorkee, he received the prestigious "Institute research fellowship for Outstanding Young faculty 2017", IIT Roorkee. He is a Fellow of Royal Society of Chemistry (FRSC), United Kingdom, Fellow of Royal Society of Biology (FRSB), United Kingdom and Fellow of the Academy of Sciences (F.A.Sc.), Chennai.

Specific work for nomination:

Dr. P. Gopinath's research group have synthesised fluorescent carbon dots from rosy periwinkle plant leaves that can be used as nanotags for detecting and killing cancer cells. Current cancer-detecting techniques use toxic metals. They are expensive to produce and break down easily when exposed to light. To develop a safe way to detect cancer cells,

researchers in the Nanobiotechnology laboratory at Indian Institute of Technology (IIT) Roorkee headed by Dr. Gopinath synthesized carbon dots by heating a solution of finely chopped periwinkle plant leaves under controlled conditions and then cooled it down to room temperature. This process yielded nanosized carbon dots. When incubated with specific cancer cells, the carbon dots entered the cells. These cells showed enhanced fluorescence, indicating that the dots reached inside the cells. The dots selectively bound to microtubules, filamentous intracellular structures that support cell division and help transport various molecules inside the cells. The dots destabilised the structure of the microtubules, converting them into fragments that accumulated inside the cells. This, in turn, inhibited the normal activity of the microtubules arresting cell division – a key property that makes the dots potentially useful for stopping the proliferation of cancer cells. This is an economical and green way to produce fluorescent carbon dots from the leaves of a common medicinal plant. This work has huge theranotic (Therapy & diagnostic) potential for cancer diagnosis and therapy.

Recently, his research group developed nanomaterials based diagnostic kit for the rapid diagnosis of lung cancer and filed an Indian patent. The proposed diagnostic kit comprises of biofunctionalized graphene quantum dots (anti-NSE/amine-N-GQDs) which act as energy donor and gold nanoparticles (AuNPs) which act as energy acceptor for the quantitative detection of neuron specific enolase (NSE), a well-known SCLC biomarker. The functionality of kit relies on the fundamental principle of energy transferring capability of donor species (anti-NSE/amine-N-GQDs) to the nearby acceptor species (AuNPs), followed by the recovery of fluorescence intensity on the addition of target antigen. The proposed fluorescent diagnostic kit successfully detected NSE biomarker with notable biosensing parameters, including wider linear detection range (0.1 pg mL^{-1} to 1000 ng mL^{-1}), the fast response time (16 min), and a remarkable low detection limit (0.09 pg mL^{-1}). Additionally, an excellent performance in real samples, with an average recovery of 94.69%. has also been obtained. This work was published in *ACS Applied Bio Materials*, 2020, featured in "nature INDIA". Very recently, they have used Ti_3C_2-MXene decorated with nanostructured silver as a dual-energy acceptor for the fluorometric cancer biomarker detection and published in *Biosensors and Bioelectronics, Sept.* 2021, *(IF=10.618)*. His contribution to Cancer research is outstanding and has made an impact on the field.

With regard to this award, Dr. Gopinath's contributions seem, to me, quite unparalleled. Considering his scientific ability and achievements, I strongly recommend his candidature for "Sun Pharma Science Foundation Research Awards – 2021". I wish him all success in his contribution to the field of science.

Dated : 27.10.2021
Place : IIT Roorkee

Manish

Signature of Head of Institution

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