

## REPORT

Report on participation of the ICMR International Fellow (ICMR-IF) in Training/Research abroad.

1. Name and designation of ICMR- IF : **Dr. G. Seghal Kiran**  
Assistant Professor
2. Address : Department of Food Science  
and Technology  
Pondicherry University  
Puducherry 605014
3. Frontline area of research in which  
training/research was carried out : Development of novel  
antibiofilm compounds in medical  
implants.
4. Name & address of Professor and host institute: **Prof. Alan Dobson**, PhD, DSc, CBiol FIBiol  
Department of Microbiology  
University College Cork  
Cork, Ireland
5. Duration of fellowship : 6 months  
(28.02.2015 to 28.08.2015)
6. Highlights of work conducted:

Aim of the visit was to develop an effective antibiofilm drug containing antimicrobial nanoparticle as active principle and nano-melanin-PHB (polyhydroxy butyrate) conjugate as antibiofilm agent for the disruption of biofilm in medical implants. The research was planned as to produce melanin through culture-dependent approach and heterologous expression/synthesis of PHB through metagenomic approach. To develop nano-melanin as potential antibiofilm agent, the study was started with the isolation of melanin from bacterial isolates obtained from deep-sea sponge specimens. The isolates were screened and evaluated for the development of nano-melanin and size-controlled synthesis of antimicrobial nanoparticles, and their efficacy on the disruption of pathogenic biofilms. Purified melanin showed broad spectrum of antimicrobial activity against clinical pathogens and also possess antioxidant property. The PHB producing clones were screened from the sponge metagenomic library using PCR assisted sequencing approaches. The positive clones were then identified by probe hybridization methods. The PHB was characterized and blended with nano-melanin and is being progressed to develop an effective antibiofilm formulation for the disruption of pathogenic biofilms.

i) Technique/expertise acquired: Cloning and expression of gene into a host cell, genome annotation, transposon mutagenesis, and triparental conjugation.

ii) Research results, including any papers prepared/ submitted for publication:

Out of 88 bacterial isolates screened for melanin production, two isolates showed positive for melanin production. Among these, the isolate WHOO155 produced a dark black melanin pigment. The produced melanin showed inhibitory effect against most of the clinical pathogens. Aiming for a novel PHB polymer, PHB producing clones were screened from sponge metagenomic library. The positive clones were identified and subclone library was produced using pBAD expression vector. The metagenome derived PHB was shown to have antiadhesive property and hence melanin was blended with PHB to form thin films. The antimicrobial and antibiofilm activity of PHB-nano-Melanin conjugate was established.

iii) Proposed utilization of the experience in India:

The research data and technical-skills gained during the ICMR fellowship visit provide significant insight on the development of novel safe potential antibiofilm agents to prevent the pathogenic biofilms in medical implants. Further evaluation and development of PHB-nano-Melanin conjugate based antibiofilm formulations are to be carried forward in Pondicherry University, India.



Signature of ICMR-IF