

Name of the MSC Fellow: Dr. Nanasaheb Thorat

Nationality: Indian

Host organization: Wroclaw University of Science and Technology

Country of the Host: Poland

Project Acronym: NANOCARGO

Project start and end date: 01/10/2018- 30/09/2020

Type of MSC action, H2020: MSCA-IF



Project objectives and research field:

NANOCARGO proposes the unprecedented in the current state of the art, both in originality and innovative aspects, approach that will enhance the efficacy of women' breast anticancer therapy by conjugating magneto-plasmonic nanoparticles with therapeutic agents into dedicated nanocargos and combing them with magnetic hyperthermia and photodynamic stimulation.

Tell us why your topic is important and/ or how it brings to advancement in your research field:

The disease targeted in NANOCARGO is breast cancer which is considered as one of the most common and invasive types of cancer in women. The current effectiveness of the cancer therapy depends on an efficient drug delivery and cancer cell killing without reoccurrence. The development of drug resistance in tumor cells plays a major role in the failure of present therapies. The highly hydrophobic nature of chemotherapy drugs makes delivery and bioavailability of these drugs difficult. This reduces the overall cancer killing performance and increases the chemoresistance.

NANOCARGO promotes the personalized and minimally invasive approach with use of functionalized anticancer nanocargos and multimodal physical stimulation. This will lead to targeted cancer cell binding, tumor-selective drug-release and boosted non-chemoresistant and chemoresistant cancer cell killing. The biocompatibility, safety and clinical efficacy of the proposed approach will be demonstrated in *in vitro* and *ex vivo* tests.

What are the benefits of participating in a MSC action?

NANOCARGO was inspired by the ‘magic bullets’ against chemoresistance proposed by Paul Ehrlich, the 1908 Nobel Laureate in Medicine. According to Ehrlich, the chemotherapeutic drugs should go *directly* to their cell-structural targets without harming healthy tissues. Project is highly interdisciplinary with converging top-end physics and chemistry of nanomaterials into minimally invasive radiological practices and incorporate both, EC and Polish cancer research strategy aims. When successful, NANOCARGO will revolutionize the way cancer diagnosis and therapy is carried out.

The MSC-IF will have huge impact on the Fellow’s career and will give him the opportunity to work in Wrocław University of Science and Technology, Poland with the host Assist. Prof. Joanna Bauer specialized in the area of personalized medicine and the secondment host Prof. Brigitte von Recherberg - one of the pioneers of clinical applications of magnetic nanoparticles based hyperthermia - from Zurich University, Switzerland.

Why did you choose a widening country as a Host? What was the reason that convinced you? What is making you professionally happy here?

Wrocław University of Science and Technology (WUST) is one of top two technical Universities in Poland with a long history of participating in EU programmes from FP4 until H2020 and well developed infrastructure that support researchers carrying out the scientific projects. In 2016, the EC granted WUST the prestigious “HR Excellence in Research” logo which is awarded to institutions that apply the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers and create the best working conditions.

The proposed MSC-IF will be hosted at the Department of Biomedical Engineering where the research staff are outstanding specialists in biomedical engineering. The institutional environment, infrastructure and expertise matches well with the project’s tasks and combines with the excellent expertise in collaborative projects, international mobility and the management of various national and international scientific and industrial projects.

Would you recommend others to apply? What useful advice/ tips can you give them?

I would recommend not only to find an excellent host but also to link to an outstanding secondment partner as both host and secondment host are important for the success of such projects. Host supervisor with excellent international network will make such applications highly competitive.