NANOFACTURING
A H2020 PROJECT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

PROJECT SUMMARY

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

THE PROJECT SUMMARY

- Project Title:

"The Development of Medium- and Large-Scale Sustainable Manufacturing Process Platforms for Clinically Compliant Solid Core Nanopharmaceuticals"

- Action Acronym: **NANOFACTURING**
- Project number: **646364**
- Starting Date: **1-February-2015**
- Duration: **48 months**
- Call Identifier: **H2020-NMP-PILOTS-2014**
- Topic: **NMP-08-2014 Scale -up of nano pharmaceuticals production**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

NANOFACTURING INTRODUCTION

- *THE DEVELOPMENT OF MEDIUM AND LARGE SCALE SUSTAINABLE MANUFACTURING PROCESS PLATFORMS FOR CLINICALLY COMPLIANT SOLID CORE NANOPHARMACEUTICALS*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

ABSTRACT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

ABSTRACT

A number of nanomedicine formulations have enabled, or been shown to hold considerable potential for enabling more effective and less toxic therapeutic interventions, particularly in the field of oncology. However, progress to date in translating these initiatives to commercial success has been challenging. One of the main reasons for this bottleneck is due to the inability of researchers and stakeholders to manufacture batches of the nanomedicine product at the required scale and according to Good Manufacturing Practice (GMP) requirements. The NANOFACTURING project will focus on-facilitating access to required infrastructures and expertise -creating GMP pilot lines for up-scaling manufacturing-addressing the current developmental and production gaps -taking nanomaterials already successfully produced at proof-of-concept/ milligram levels and facilitating their scale-up to sub-kilogram quantities-providing large-scale and GMP production for clinical trials and nanomedicine translation. The NANOFACTURING project, through a consortium of 9 partners, will develop the synthetic processes, process control methods, analytical assays for QA/QC, functional specifications, and best practices, interfacing existing R&D centres of excellence, transfer organisations and private GMP manufacturing facilities (including SMEs) to ensure efficient translation from discovery through to first in man, proof-of-concept studies and beyond to Phase III according to industrial and regulatory standards. Specifically, the NANOFACTURING project aims to create a platform process for early, mid-and large-scale manufacturing of glycan-coated gold nanoparticles (GNPs), a widely researched and developed class of self-forming nanoparticles, in the field of oncology and other medical indications.

The ability to engineer new nanopharmaceuticals based on this patent protected platform technology, developed by Midatech BioguneS.L. (Project Coordinator), will have inherent advantages over existing treatments for multiple therapeutic areas.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

CONSORTIUM

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

THE CONSORTIUM

- **The Consortium**
  - 9 partners from 5 EU members states and 1 associated country.
  - 6 industrial SME's
  - Multidisciplines capabilities: Nanotechnologists, materials scientists, biomedical researchers, industrialists and regulatory specialists
- **Participants:**

MIDATECH PHARMA

Midatech Pharma España & Midatech Ltd (Midatech Pharma Group)

cpi

CPI

prochimia surfaces

ProChimia

cbni centre for bionano interactions

CBNI - UCD

GalChimia

GalChimia

Applus laboratories

LGAI-Applus

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

EPFL

IFOM THE FIRC INSTITUTE OF MOLECULAR ONCOLOGY

IFOM (1-Feb-15 to 31-Jan-16)
Istituto Tumori (From 1-Feb-16)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

INTRODUCTION & OBJECTIVES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

SCIENTIFIC OBJECTIVES (1)

- Establish an open access pilot line in Europe as part of existing UK innovation centre for the process development and scale up of nanopharmaceutical manufacture, enabling other SMEs and large companies to progress their products to market.
- Further develop our existing GMP manufacturing line to be capable of supplying nanomedicines from 0.1-0.5kg batches to support Midatech's planned internal clinical oncology programs and beyond, partner programs (e.g. antiviral Dengue fever NP), and other EU-wide nanomedicine programs independent of Midatech.
- Scale up the primary ligand component manufacture to meet the NP manufacturing requirements at all levels.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

SCIENTIFIC OBJECTIVES (2)

- Establish a full spectrum of robust and practical chemical and biological characterization tests and procedures to meet stringent regulatory requirements for the manufacturing processes developed and guarantee the quality, safety and efficacy of the product(s) at all scales.
- Develop a new manufacturing platform process (and accompanying GMP plant design and concept brief) for solid core nanopharmaceutical products, capable of scale up to supply Phase III trials and beyond which is cost effective, safe, efficient, robust and regulatory compliant.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

WORK PACKAGES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

WORK PACKAGES

WP1 - Project Management and Reporting

WP2 - Platform Assessment and Specification of Technology Platform Requirements

WP3 - Scale-Up of Ligand Manufacture

WP4 - Scale up of existing Reactor-based NP manufacture

WP5 - Process development and scale up of solid core NP and peptide linked NP manufacture to clinical supply scale

WP6 - Physicochemical and biocompatibility characterization of NPs

WP7 - Evaluation and generation of Concept Designs, guided by preparation of a User Requirement Brief

WP8 - Exploitation and Dissemination

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

WORK PACKAGES

NANOPHARMACEUTICAL MANUFACTURE: STAGES

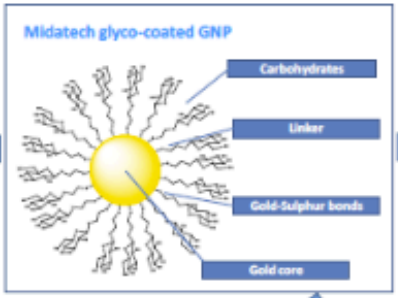
Industrial Scale-Up

Development and scale up of the process for the base gold nanoparticles

GNP Industrial Manufacture using Continuous Flow Technology

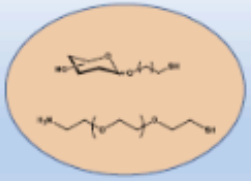
Purification by Continuous Flow centrifugation

GNP Industrial Purification using Tangential Flow Filtration



LIGANDS

- Optimization of synthetic routes for ligand manufacturing
- Scale-up of ligand manufacturing process to supply kilos

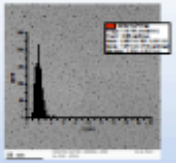


Thio-glycoconjugates and amino-thio-PEG linkers

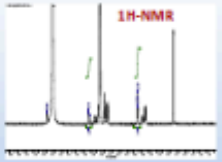
Nanopharmaceutical Characterization

A full package of physicochemical, biophysicochemical and biological characteristics of the nanopharmaceuticals will be developed.

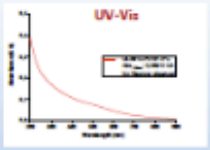
TEM

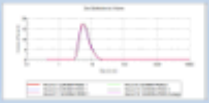


1H-NMR

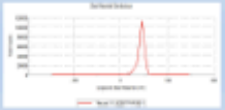


UV-Vis

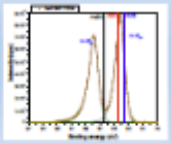




DLS



Z-potential



XPS

Pilot Scale GNP Batch

Scale up of current 400ml GMP batch manufacturing process for gold nanoparticles up to 5 and 10 litre reactor volumes.

Reactor 5-10 L

Tangential Flow Filtration

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646364

nanofacturing

nanofacturing