SUN-PILOT
The story of first Irish-Led Pilot Line
H2020 Consortium

Dr. Parvaneh Mokarian
mokariap@tcd.ie

Advanced Materials and BioEngineering Research Centre (AMBER) and CRANN
Trinity College Dublin

H2020 Industry Leadership Pillar (ICP/NMBP)- Info day, UCD, 18th October 2017
Profile

Dr Parvaneh Mokarian
Senior Research Fellow, AMBER Centre, Trinity College Dublin, Ireland
e-mail: mokariap@tcd.ie

- Polymer physicist
- **Research Interest:** Polymer thin films, block copolymer self-assembly, Bio-mimicked nanopatterned surfaces, anti-reflective surfaces, optics, functional materials and surfaces, superhydrophobic surfaces, nanotopography-biomaterial interactions

**Zeroptica technology:** A high throughput solution for nanopatterning surfaces based on “Block Copolymer Self-assembly Technique”

Grant profile (2017)

• Coordinator of newly funded H2020 Pilot-Line consortium called SUN-PILOT

Project: Piloting of Innovative Subwavelength Nanostructure Technology for Optical and Injection Moulding Applications (SUN-PILOT)

Budget: €8.3 million

Partners: 13 Partners, including 9 industrial partners (5 large industry and 4 SMEs), 2 research institutes and 2 universities, from 6 European countries.

Industry sector: Optics and automotive industry (Injection moulding of plastic parts)

Duration: Jan 2018-Jan 2022

• Principal Investigator of Enterprise Ireland Commercialisation Fund

Budget: €570,000

Duration: Oct 2017-Oct 2019
The backbone technology of SUN-PILOT

SUN-PILOT is based on a technology (Zeroptica) we developed in AMBER centre (UCC/TCD) through EI commercialisation fund since 2014.

- **Zeroptica** is a platform technology for nano-patterning large and curved surfaces to achieve different functionalities ([www.zeroptica.ie](http://www.zeroptica.ie))
- Presenting this technology, we won the **Best Innovation Award** in SPIE Conference Innovation Village held in Brussels in April 2016: [https://spie.org/conferences-and-exhibitions/photonics-europe/photonics-innovation-village/2016-award-winners](https://spie.org/conferences-and-exhibitions/photonics-europe/photonics-innovation-village/2016-award-winners)

Large $M_w$ block copolymers on optical surfaces (the dots are 115±15 nm)

Zeroptica technology

Patterning curved surfaces such as optical lenses

The unique selling point of Zeroptica technology:

- Tuneable and high aspect ratio (2-15) nanstructures → can not be achieved by other techniques easily
- Solution based → for nanopatterning curved surfaces such as optical lenses/arbitrary shaped objects such as moulds
- Commercially viable and can be scaled up

Applications of Zeroptica technology

**Superhydrophobic surfaces**
- Self-cleaning property

**Modified wetability**
- Superhydrophobic surfaces

**Superior IR detection**
- Night vision goggle
- Enhance the sensitivity of image sensors in near infrared (NIR) regions

**Broadband antireflection**
- High power lasers
  - Eliminate multiple AR coating layers
  - No need for high vacuum equipment

**Sharper low light photography**
- Better photography at night
- The photon count is increased

**In vivo medical imaging**
- Collimated beam profile
- Superior antireflective property
- Directs more light to point of care
- Biocompatible
How to convert your idea to a proposal

**TOPIC**: Pilot Lines for Manufacturing of Nanotextured surfaces with mechanically enhanced properties

**Innovation Action (IA) calls** → high TRL proposals

(Plan to go from TRL 4 to 7)

- Project idea ≠ Proposal idea
- From Invention → to Innovation
- From Zeroptica → to SUN-PILOT

**Zeroptica**
- ✔ Proof of concept
- ✔ An innovative Nanofabrication technique
- ✔ Invention- TRL 3-4

**SUN-PILOT**
- ✔ Scaling up, piloting, prototyping, testing in real industrial set up,
- ✔ Innovation, TRL 6-8
SUN-PILOT

Piloting of Innovative Subwavelength Nanostructure Technology for Optical and Injection Moulding Applications

Cross-Cutting Activities

Materials
Partners 2, 5 & 6

Innovative Nanotechnology
Partners 1, 3 & 11

Material Development
Partners 2, 5 & 6

Optimisation
Partners 1-11

Prototype & Pilot
Partners 1-11

Life Cycle Analysis & Validation
Partner 12

Exploitation
Partners 1 & 13

Strand 1: Optics
Partners 3, 4, 7 & 10

Strand 2: Automotives
Partners 8 & 9

PARTNERS
1 Trinity College Dublin (TCD), IE
2 Fraunhofer IAP (FHG-IAP), DE
3 Irish Precision Optics (IPO), IE
4 Coherent Scotland Ltd. (COH), UK
5 University of Bordeaux (LCPO), FR
6 Microresist Technology (MRT), DE
7 NKT Photonics (NKT), DK
8 Tecnalia (TEC), ES
9 Grupo Antolin Ingenieria (GAI), ES
10 Qioptiq (QUK), UK
11 AMO, DE
12 Vertech Group, FR
13 Elucidare (EL), UK

Reduction in Manufacturing Costs - Decrease in Environmental Impact - Increase in Safety
Economic Growth - Job Creation - Development of New Innovative Products (optics, cars, biomedical devices)
Rise in Industry Competitiveness - Other Applications (smart packaging, solar cookers)

SUN-PILOT partners and project outline

Optics Industry

Automotive Industry

Other Manufacturing e.g. roll2roll, nanoimprint lithography (NIL), electronic displays biomedical devices

Impacts

Partnersing for Material Impact
How to coordinate your proposal?

Step 1: Understand the call and listen to industry
(You have to understand the problem first in order to suggest a solution)

In the call document:
Familiarise yourself with the call.
• What is expected? → read over and over again
• Who are the beneficiaries? → industry sectors?
• Who has written the call? → network, talk to companies (not easy)
• Address a real industrial challenge → Don’t be shy asking “simple” questions
• Talk to your Research Office and National Contact Point for advice
• Apply for EI Coordinator grant (12k)
• Try to attend H2020 brokerage or similar events to introduce your proposal idea
How to coordinate your proposal?

Step 2: Vision

Clear **objectives**

Proposal **identity**

Project idea

Identifying the right **sector(s)**

Choose the right **partners**

IA proposal

A dynamic process…
Optics and Automotive industry
Refer to the identity…
How to coordinate your proposal?

Step 3: Coordinate it like a real captain

- You are the master mind of this project → your job is to provide direction (e.g. ask each partners to write their WPs, to get an idea. You merge them)

- Write and read the proposal as an evaluator as well as the coordinator! (Does it excite you? Is it jargon free? Ask non experts to read and see if they find it interesting)

- Address everything mentioned in the scope, impact, exploitation, dissemination etc

- As well as identifying the challenges, outline clearly how you are going to deliver solution (Impacts)

- Have a long term vision for 5 years after the life time of the project
Remote phase

SUN-PILOT consortium meeting (stage 2)
7-8th March 2017, TCD

- Consortium meeting is very important.
- Prepare in advance! Make sure you are clear what you want to get out of it. (Deliverables, milestone, WP leaders, impact etc)
- Time for bonding
- Time to impress them (your leadership skill + your organisation)

(Special thanks to Emma Leahy)
Impact/exploitation
SUN-PILOT consortium meeting- March 2017- stage 2

We asked partners to think about impact:
(below are some examples. Please add you bit)
Impact (+dissemination and exploitation) is very important for this proposal and weighs 1.5 more than Excellence. We have to maximise the impact.

List applications:
- Product (1) new materials? Name it
- Product (2) parts with new functionality?
- Product (3) improved xx
- Improved xx for the society
- Environmental impact
- Communication (present is science gallery/museums/schools etc)
- What else?

Exploitation
- Start-up company
- 1% increase in staff number? (creating jobs)
- Exclusive licence agreement for partners (10%)
- Fair trades (name some big famous ones), exhibition
- Workshops (including other European stakeholders)
- Validation

Exploitation (Beyond the life time of the project)
- 60% commercialisation (growing start-up company)
- 30% licensing the pilot line to other stakeholders in Europe
- Validation of the pilot line/products for other markets such as medical devices or marine industry
- Identify other stakeholders/competitors
- What else?

TRL (1) TRL (4), now TRL (7)
Year 1-3 Year 4 Year 5-10

Business plan?
How to quantify Impact? → jobs, economic growth, estimation

Thanks to Sergio Fernandez-Ceballos (NCP)
Summary

- Project idea vs. proposal idea
- Invention vs. Innovation
- Listen to industry and their problems
- Be open minded and be prepared to change direction
- There is no clear linear path. You learn as you go…
- Understand the call fully
- Vision
- IA is about creating jobs (quantified impacts), helping European industry to thrive, environment impact, societal and global challenges
- Impact beyond the life time of the project
- Consortium meeting
- Talk to your TTO, commercial, research team and national contact point. Make contacts
- Start the process early