



# Rosen Georgiev

**Technology Centre:** Centre for Research in Engineering Surface Technology (CREST)

**Academic Mentor:** Dr. Suzanne Martin

**Company Partner:** Diamond Glass

**Company Mentor:** Mr. James Crumlish

Rosen has completed his PhD in Condensed Matter Physics at Institute of Optical Materials and Technologies, Bulgarian Academy of Sciences in 2020, MSc in Photonic Network Engineering as part of Erasmus Mundus MAPNET program (2013) and BSc in Telecommunications in 2009 at Technical University of Sofia, Bulgaria. He has conducted two research visits at Institute of Electrical Engineering, Slovak Academy of Sciences (2020) and Institute of Solid State Physics, Polish Academy of Sciences in 2021. As of October 2021, he is Career Fit Plus Fellow in FOCAS, TU Dublin under Dr. Suzanne Martin's supervision, in the Centre for Industrial and Engineering Optics.

## Dr. Suzanne Martin

Dr. Martin is Centre Manager for the TU Dublin Centre for Industrial and Engineering Optics(IEO) and PI for the Holography for Diffractive Optical Elements Group. Dr. Martin has considerable research experience in holographic materials and devices, particularly in developing new photopolymer materials, Holographic Optical Elements, holographic patterning systems and diffraction.

Dr Martin has been co-inventor of a number of new technologies developed in IEO with applications in product authentication, sensing, vibration measurement and optical device fabrication, for which three patents have been granted to date. She has exceptional supervision and mentoring experience. Dr. Martin is currently serving as TU Dublin Representative for EPIC (European Photonics in Industry Consortium).

## Mr. James Crumlish

James Crumlish is co-owner and director of Diamond Glass. He has a strong interest in the area of energy harvesting and is investigating several routes for introducing such technologies into his production offering. He is responsible for training and upskilling his own employees and graduate hires, which reveals his capacity in technical skills needed for the glass processing industry. The fact that the owner of Diamond Glass takes student interns regularly from local colleges and universities shows his personal attitude and commitment to science and education.

## CREST

### Centre for Research in Engineering Surface Technology

The CREST Gateway is the only dedicated surface coatings laboratory in Ireland providing access to a range of coatings technology including very significant expertise in sol-gel coatings. CREST Technology Gateway is addressing the needs of the Irish engineering, aerospace, automotive, architectural, electronics, biomedical and healthcare sectors in the area of surface coatings. The CREST team has worked with both IEO and Diamond Glass on several projects focusing on glass coatings and properties. Some of this work has been published and patented.

### Diamond Glass

Founded in 2001, Diamond Glass manufactures top quality flat glass products and specialise in Sealed Double Glazed Units. Through ongoing investment in up-skilling their team and in acquiring state-of-the-art machinery and equipment, the business has grown to become a leading provider of specialist glazing to the trade in Ireland and the UK. In recent years, Diamond Glass has developed a special interest in multi-ply laminate solutions for ballistic, anti-attack, walk-on glass applications and smart glass products. With the collaboration done in this project they hope to enrich their product portfolio by the implementation of new and innovative products.

### Host Institution

#### Technological University Dublin (TUD)

TU Dublin is a globally engaged, comprehensive, research-informed university. It hosts a thriving research community engaged in applying innovation and technology to solve the most pressing challenges facing business, industry, and society in a dynamic environment. TU Dublin has prioritized its research activities in thematic clusters and built up Research Institutes and Centers of Excellence in selected areas founded in fundamental research and applied expertise.

Currently the main themes are:

- Environment, Energy & Health
- Information, Communications & Media Technologies
- New Materials & Devices
- Society, Culture & Enterprise

## Rosen's project

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### SUNTRAPP - Solar collection Using Novel TRansparent hologrAphic PhotoPolymer

Solar energy is a safe, low cost, energy source with huge potential to address the world's growing energy needs and photovoltaics are considered to be the key to moving into a clean energy future. One of the major challenges to the widespread use of solar panels is their cost. Another is their need for space. Cost issues can be improved by developing a system which could collect the sunlight that strikes a wider area and redirect it into solar cells (solar concentrators), reducing the amount of expensive solar cell material. Among the different categories of solar cells, window-integrated solar cells attract particular attention for domestic solar harvesting, because they can simultaneously transmit light as well as produce electricity. At the same time, smart technologies are being developed for windows and glass structures that improve thermal characteristics and control light levels. New products even allow users to control the transmission and transparency characteristics of windows and other glass structures.

SUNTRAPP project aims to provide a cost-effective route to fabrication of transparent light concentrators for solar window applications. We seek to address and overcome this challenge by novel optical design based on volume holographic optical elements.

