**Marie Curie Career Integration Grant – Final Report**

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| **Prof. Michael P. Shaver**  **greenmaterialslaboratory.wordpress.com** | **cropped-gml-logo.jpg** |

The Marie Curie Career Integration Grant was an essential early funding source to help transition the research group and principal investigator from the University of Prince Edward Island (Canada) to the University of Edinburgh (Scotland). The funding was used to support the purchase of essential equipment and doctoral student stipend. The move to Edinburgh has been truly transformative.

Dr Michael Shaver was recently promoted to a Professor of Polymer Chemistry at the University of Edinburgh. His Green Materials Laboratory focuses on developing new catalysts, monomers and materials using Controlled Radical Polymerisation (CRP) and Ring-Opening Polymerisation (ROP) reactions. The group targets systems that are functional group tolerant, have high activity, stability and specificity, and can access polymers and copolymers with enhanced properties or functionalities. Dr Shaver received his PhD in ligand design and small molecule activation from the University of British Columbia under the supervision of Professor Mike Fryzuk. After a PDRA in catalyst design and polymer synthesis at Imperial College London with Professor Vernon Gibson, FRS, he started his independent career at the University of Prince Edward Island. Following a University Research Professorship at UPEI, he was recruited to the UoE in October 2012 as a Chancellor’s Fellow. He was promoted to his current Professor position as a Personal Chair in Polymer Chemistry in 2017 and has been the Head of Graduate School in the School of Chemistry since 2014.Dr Shaver is the author of 73 papers, 6 patents and has given 58 plenary/invited lectures at international conferences and institutions. He is at the forefront of the movement to develop sustainable, functional materials and was the inaugural Editor-in-Chief of the international journal *Green Materials* (2012-2017). His work has been recognised by a number of awards, including the MacroGroup Young Polymer Scientist award (2015), Membership of the Young Academy of Scotland (2014-2019), a Chancellor’s Fellowship (2012-2017), the UPEI Research Chair in Green Materials Chemistry (2009-2012), the Presidential Recognition Award (2012), two Canada Foundation for Innovation Leadership Awards (2010, 2012), the Scholarly Achievement Award (2012), the CNC-IUPAC Travel Award (2010), as well as numerous awards throughout earlier PDF and PhD career stages including prestigious NSERC Postgraduate Scholarships and Postdoctoral Fellowships and a Millennium Canada/UK Award. His leadership includes extensive training of highly qualified personnel (8 PDRAs, 24 graduate students, 39 undergraduate students). His current research group consists of 2 PDRAs, 17 PhD students (many are trans-disciplinary, co-supervised candidates) and 3 undergraduate researchers.

The early support was also essential in leveraging further financial support from RCUK and industry sources. Dr Shaver now has extensive experience in collaborating with academic and industrial partners, including successful partnerships exploring intrinsic high refractive index polymers (Samsung), oligonucleotide-crosslinked hydrogels (Axis-Shield and Medical Research Council), micelles for oral health care applications (GSK) and renewable, compostable thermosets (Itaconix). He has also led a number of RCUK grants, including two productive EPSRC grants as PI (EP/P026095/1 & EP/M000842/1) and a major £1.5 million grant for an essential cryo-Focussed-Ion-Beam-Scanning-Electron-Microscopy-Computed-Tomography instrument (EP/M000842/1).

Scientifically, the support allowed the group to focus efforts on the development of sustainable polymers and plastics. The Shaver group is committed to the development of biodegradable materials as a complement to petroleum-derived plastics, accessing renewable, degradable and non-toxic materials for biomedical, nanotechnology and commodity applications. They have developed catalysts to simultaneously control both polymer macrostructure and microstructure and have shown how this can be used to tune physical properties (degradation rates, Tg, Tm, self-assembly) in aliphatic polyester polymer stars and block copolymers, using catalyst design as a guide in both ring-opening and controlled radical polymerisations. The group also works in expanding monomer scope in ring opening, accessing thermoplastic elastomers, new selectively degradable polyesters and new polymers through post-polymerisation modification. This includes a major new project developed by the student funded by this MC-CIG grant, who developed a new family of monomers for the preparation of (bio)degradable aliphatic polyesters by the elimination of small molecules from sustainable 1,3-dioxolan-4-ones. The project develops inexpensive routes to sustainable, functional polyesters (such as biodegradable polystyrene mimic, isotactic poly(mandelic acid)) and has enabled significant follow-on funding to be obtained.