PRESS RELEASE

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Leaving range anxiety behind: the EV project powering next generation battery systems

- **The i-CoBat project – a collaboration between M&I Materials, WMG and Ricardo – aims to develop and demonstrate a new form of EV battery cooling technology based on cell immersion cooling using dielectric fluid**
- **This innovation promises improved power output and cell longevity, faster charging rates and lower costs, significantly addressing the key consumer issue of range anxiety**

As the automotive industry seeks to electrify its product ranges, the thermal management of high capacity batteries used for electric vehicles (EVs) is proving a significant challenge. The performance and efficiency of battery cells can deteriorate – and their ageing can be accelerated – if operating temperatures exceed the upper or lower limits of a comparatively narrow range. In extreme cases, exceeding upper operating limits can risk thermal runaway of cells, leading to catastrophic failure and potentially, fire.

For market acceptability – and in particular, to persuade owners of liquid-fuelled vehicles to switch to an EV – charging times are a significant challenge in terms of alleviating range anxiety. Consumers seek fast recharging times, good performance and range, and competitive prices; during fast charging, however, battery cells can produce up to three times more heat energy than in normal driving and charging operations; with heating of the cells being a dominant factor in battery ageing

and performance degradation. Using current battery cell technology, therefore, the requirement for thermal optimization of pack design and operation is a vitally important one.

Current EV batteries packs tend to use air cooling or cold plate cooling using water/ethylene glycol or a refrigerant. The limitations of such thermal management systems act to restrict charging rates or the number of fast charge cycles that can be carried out each day. One possible answer to range anxiety could be to increase pack size, but this would significantly increase costs.

Led by M&I Materials, the i-CoBat project is part of the government's Faraday Battery Challenge and will test an immersion cooled battery pack concept using M&I Materials' biodegradable dielectric cooling fluid, MIVOLT. M&I Materials have been working in advanced materials and electrical insulation for over 100 years, with a core specialism in dielectric fluids for more than 40. The innovation promises improved power output and cell longevity, faster charging rates and lower costs, significantly addressing the key consumer issue of range anxiety.

James O'Brien, M&I Materials Product Group Director, said: "We are very proud to be working with such distinguished companies. Ricardo will bring its extensive knowledge of EV battery pack and battery management system design and thermal management to the project while WMG will lend its impressive research capabilities to address the move from research and development to commercialisation."

"Power, performance, practicality such as fast charging times, and price are key determinants in persuading consumers to opt for an EV rather than a liquid-fuelled vehicle when they next change their car," commented Ricardo Chief Technology and Innovation Officer, Neville Jackson. "With current cell technologies, thermal management is a crucial enabler for improvements in these areas in order to reduce or eliminate range anxiety, and promote consumer acceptance of electric cars. Ricardo is pleased to be participating in this very promising project together with M&I Materials and WMG."

Professor David Greenwood, Professor of Advanced Propulsion Systems at WMG, the University of Warwick, added: "As we seek to extract the maximum possible energy and durability from a battery, and to replenish it as quickly as possible, thermal management becomes critical. It's no longer just a matter of keeping the battery cool – it's about optimizing the temperature for any given operation.

There are many cooling mechanisms used by different manufacturers, and this project allows us to investigate a close-coupled cooling mechanism with a biodegradable coolant."

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NOTES TO EDITORS:

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WMG, at The University of Warwick is a world leading research and education group transforming organisations and driving innovation through a unique combination of collaborative research and development, and pioneering education programmes. As an international role model for successful partnerships between academia and the private and public sectors, WMG develops advancements nationally and globally, in applied science, technology and engineering, to deliver real impact to economic growth, society and the environment. WMG was founded by Professor Lord Kumar Bhattacharyya in 1980 to help reinvigorate UK manufacturing and improve competitiveness through innovation and skills development. For more information visit: www.warwick.ac.uk/fac/sci/wmg.

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