

# Boosting EV range with microwave energy

*A novel energy storage system to boost EV driving range during hot or cold weather, by coupling a chemical heat pump with microwave energy*

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We predict that e-Thermal banks would provide efficient cabin temperature control and a range extension of up to 70%, at a lower cost than increasing battery capacity.”

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BIRMINGHAM, WEST MIDLANDS, UNITED KINGDOM, February 22, 2024 /EINPresswire.com/ -- Researchers from the University of Birmingham, U.K., are working on a novel energy storage system to boost EV driving range during hot or cold weather, when using the car's climate control system can consume a significant amount of electric power, and subsequently reduce the driving range, by as much as 40%1.

The method, invented by Birmingham energy expert Professor Yongliang Li during research into technologies for a zero-carbon future, couples a chemical heat pump with microwave energy, and produces heating or cooling

on demand, with much higher energy density than battery packs.

Called [e-Thermal bank](#), the system is a secondary energy source for electric vehicles. It is 'charged' at the EV charging station by using microwave energy to dissociate a solid-vapour working pair and also condense the vapour into liquid. This charging process stores the microwave energy inside the car, in the e-Thermal bank.

During discharging, the process is reversed by feeding the vapour into a reactor to generate heat through an exothermic reaction, while a liquid-gas phase change process in an evaporator generates cooling simultaneously.

Professor Yongliang Li is Chair in Thermal Energy Engineering in Birmingham's School of Chemical Engineering. His research focusses on thermal energy processes and systems including thermal energy (heat and cold) storage, refrigeration, air conditioning, carbon capture and storage, process and system simulation and optimisation. Much of his research is supported by the Engineering and Physical Sciences Research Council (EPSRC).

He said: "Heating and cooling the EV cabin requires considerable energy and is the most significant contributor to EV range reduction. We aimed to offload these thermal management

tasks to a microwave driven process. Microwave is a fast heating method, because microwaves penetrate uniformly through materials and so deliver energy evenly into the body of the material. The energy cost can be minimised by coupling with a smart meter to charge the system when energy is cheap, and the stored energy can then be used at any time."

"We predict that by replacing conventional HVAC and possibly a small portion of the battery pack, the e-Thermal bank would provide efficient cabin temperature control and a range extension of up to 70%, at a lower cost than increasing battery capacity."

University of Birmingham Enterprise has filed a patent application covering the e-Thermal bank system and method for storing energy and is seeking commercial partners for licensing collaboration or co-development.

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