

# Revolutionising concrete and composites through micro- and nano-engineering for circular economy solutions in railway and other civil construction

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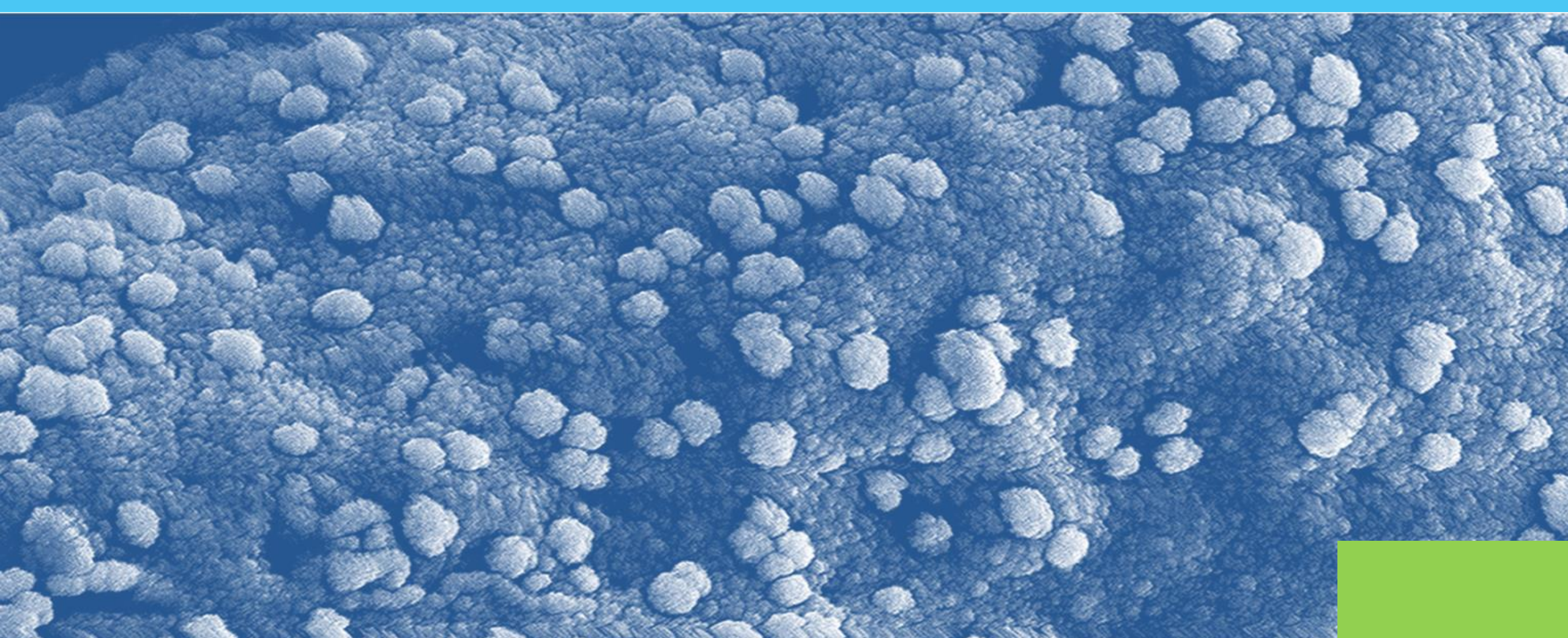
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# Revolutionising concrete and composites through *micro-* and *nano-*engineering for circular economy solutions in railway and other civil construction

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**Synopsis:** This BRIDGE project built on research strengths of both the University of Birmingham (UoB) and the University of Illinois at Urbana Champaign (UIUC) to perform fundamental investigations on performance, dynamic damping, durability, dielectric property, and dynamic resistance of micro and nano-engineered CRC (crumbed rubber concrete). Both in the UK and USA, millions of tons of non-biodegradable waste rubber is produced annually. Significant researches into the recycle of waste rubber in structural concrete have been carried out over recent years; however, most research still shows that the increase in damping is achieved while sacrificing strength. In this project, for the first time, micro and nano-sized rubber inclusions with various surface characteristics along with silica fume are used in order to achieve high strength (over 50 MPa) while maintaining high damping for real-world solutions.

Materials  
Testing



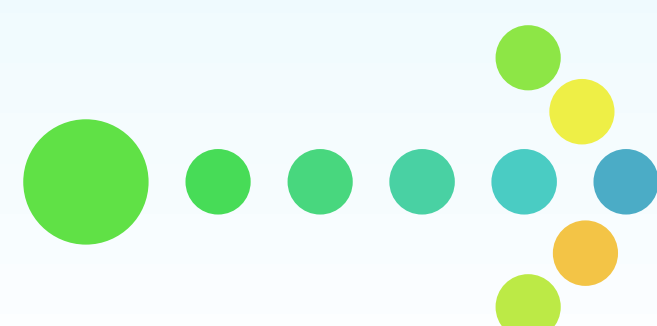
“BRIDGE grant offers critical support to expand our research horizon, resulting in multiple joint scientific outputs, new collaborators, and larger research grants. *Together we can change the world...*”

## UoB Collaborators:

Dr Sakdirat Kaewunruen (PI)  
Prof Peter Robery  
Prof Ravindra Dhir

## UIUC Collaborators:

Dr Paramita Mondal (PI)  
Dr Ange-Therese Akono (PI)  
Prof Christopher P.L. Barkan  
Prof Erol Tutumluer  
Prof Bill F. Spencer  
Dr Riley Edwards



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## Impacts



6 journal articles; 4 keynotes;  
7 conference papers



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partnerships



Research grants with total  
award > £1 million



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