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**Title: FACILITATE STRUCTURAL REHABILITATION USING SMART MATERIALS; LOW ENERGY-LOW COST CARBONE FIBRE & RUBBER MODIFIED EPOXY RESIN**

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**ABSTRACT**

Although the method of external attachment of CFRP to the concrete members is the most effective and economical solution for strengthening and repairing concrete structure in the century, the bonding issue between CFRP and the hosting surface still a challenge for the structural engineers. Many solutions are proposed to overcome the early de-bonding failure in the strengthened members. Currently, research at Deakin University is aiming to develop a new low energy-low cost carbon fibre (LE-LC-CFC) in combination with a modified epoxy resin to form a new composites suitable for civil infrastructures low cost applications. The new composite is applied to major reinforced concrete elements for testing. The new material development and the structural testing will be carried out at the new carbon nexus facility and the concrete lab, located at Deakin University. The new rubber modified epoxy resin will have softer mechanical properties to overcome the common failure mode of pre mature de-bonding of the CFRP laminates. The experimental results from two test series on RC beams and slabs showed that using the rubber modified epoxy will improve the overall ductility and delay de-bonding. A mathematical models are developed to predict the behaviour of RC beams and two-way slabs. The use of LE-LC-CFC as structural retrofitting composites is proved to produce extended ductile behaviour and hence delayed de-bonding of the retrofitted beams.