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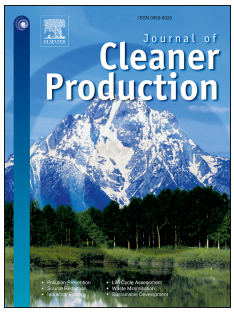

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Evaluation of Properties and Performance of Rubber-Modified Concrete for Recycling of Waste Scrap Tire

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Abstract

Using rubber particles as concrete aggregates can reduce the environmental impacts caused by the large accumulation of scrap tires. However, the added rubber particles can decrease concrete strength due to their low stiffness and surface bonding with cement paste. This study aims to improve the rubber concrete performance by employing different surface treatment and coating methods. Particularly, two surface treatment methods (NaOH, and Silane Coupling Agent) and three coating techniques (coated with normal cement, blended cement with silica fume, and blended cement plus sodium silicate) were used to improve rubber-cement bonding. Totally, ten groups of rubber concrete samples were prepared by using difference treatment or rubber replacement ratio. In addition, the control concrete samples without rubber particles or with as-received rubber particles were prepared for the comparison. The compressive strength tests demonstrated the NaOH-solution treatment can significantly improve the rubber concrete strength by comparing with normal and as-received rubber concrete. Further tests indicated that the samples with 25% replacement can still fulfil the strength requirements for rigid pavement construction. The measured electrical resistivity of rubber concrete were higher than the normal concrete, which indicates lower permeability and better durability. The decreased thermal conductivity and sound transmission attenuation can increase building energy efficiency and reduce noise, respectively. Overall, this study demonstrated

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