

## Sustainability of Carbon Nanotube-Reinforced Concrete

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**Abstract :** Concrete, despite being one of the most produced materials in the world, still has weaknesses and drawbacks. Significant concern of the cementitious materials in structural applications is their quasi-brittle behavior, which causes the material to crack and lose its durability. One of the very recently proposed mitigations for this problem is the implementation of nanotechnology in the concrete mix by adding carbon nanotubes (CNTs) to it. CNTs can enhance the critical mechanical properties of concrete as a structural material. Thus, this paper demonstrates a state-of-the-art review of reinforcing concrete with CNTs, emphasizing on the structural performance. It also goes over the properties of CNTs alone, the present methods and costs associated with producing them, the possible special applications of concretes reinforced with CNTs, the key challenges and drawbacks that this new technology still encounters, and the most reliable practices and methodologies to produce CNT-reinforced concrete in the lab. This work has shown that the addition of CNTs to the concrete mix in percentages as low as 0.25% weight of cement could increase the flexural strength and toughness of concrete by more than 45% and 25%, respectively, and enhance other durability-related properties, given that an effective dispersion of CNTs in the cementitious mix is achieved. Since nano reinforcement for cementitious materials is a new technology, many challenges have to be tackled before it becomes practiced at the mass level.

**Keywords :** sustainability, carbon nano tube, microsilica, concrete

**Conference Title :** ICUSP 2017 : International Conference on Urban Studies and Planning

**Conference Location :** Zurich, Switzerland

**Conference Dates :** July 27-28, 2017