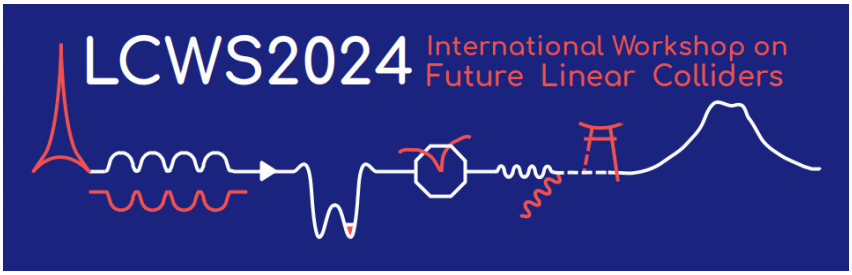

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Need of the hour: Carbon Utilized Concrete (CUCO)

Tuesday 9 July 2024 17:15 (10 minutes)

Concrete, the quintessential construction material composed of cement, water, sand, and aggregates, is indispensable for infrastructure and societal advancement. As the threat of climate change looms, the construction industry is striving to reduce the carbon emissions from concrete production. This study offers an in-depth analysis of practical applications and introduces advanced technologies designed for mass production of eco-friendly, low-carbon concrete.

The research outlines three innovative strategies to reduce concrete's carbon footprint. The first substitutes traditional cement with industrial by-products like blast furnace slag, fly ash and recycled cement lowering associated carbon emission. The second employs cutting-edge admixtures that promote CO2 absorption during curing, enabling CO2 mineralization within the concrete matrix. The carbonation curing not only sequesters CO2 but may also improve concrete's material properties. The third strategy integrates waste material processed using mineral carbonation technique and applied as sustainable aggregate alternatives.

The feasibility of above strategies needs to be supported by the development of green technologies and specialized machinery. After years of comprehensive research regarding carbonation curing of concrete, the carbonation chamber, a sophisticated device that expedites the carbonation of concrete has been developed. It provides a controlled CO2 rich environment for efficiently mineralizing CO2 from exhaust gases within concrete at an enhanced rate, effectively transforming concrete into a carbon sink. Another significant advancement is the creation of large-scale carbonation reactors that collect calcium rich highly alkaline industrial effluents, followed by processing and mineralizing CO2 into stable calcium carbonate. Furthermore, in-depth research is being conducted on development of methods so that by-product can be incorporated into concrete without compromising its integrity and properties.

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