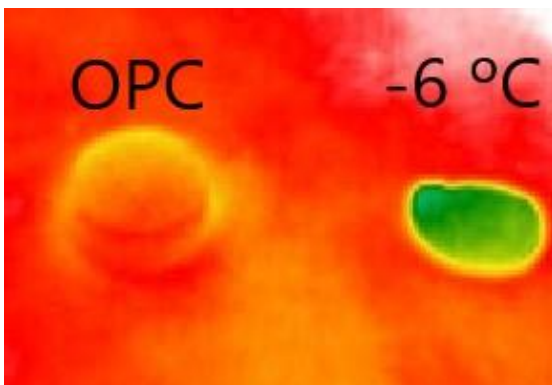


TRANSFORMING CO₂ CAPTURE IN COOL MATERIAL

The urban heat island effect has emerged as a pressing challenge in urban areas, exacerbating heat-related issues and escalating energy consumption. Addressing this issue requires innovative solutions that can effectively mitigate the impact of urban heat islands.

In response to this critical problem a groundbreaking sustainable cement formulation emerged by blending Portland cement with Periwinkle shell powder-based carbonated aggregate. This material, through an innovative carbonation process, captures CO₂ and converts it to calcite, offering exceptional solar reflectivity for cool pavements and roofs. (G.Goracci et al. "Cool Concrete Incorporating Carbonated Periwinkle Shell: A Sustainable Solution for Mitigating Urban Heat Island Effects" ; ACS Sustainable Chem. Eng. <https://doi.org/10.1021/acssuschemeng.3c05817>).



Infrared picture of standard OPC (left) and cool material with carbonated aggregates (right)

The incorporation of carbonated aggregate in the concrete led to a substantial improvement in reflectance (+62%) compared to that with OPC. A real test demonstrated that the new cement material achieved a remarkable cooling effect, being 6 °C cooler than standard OPC at the peak of solar radiation.

The successful development of carbonated concrete with high solar reflective properties holds significant implications for sustainable urban development. Through the integration of such elements into urban structural components, there exists the potential to alleviate UHI effects, decrease energy usage and establish urban environments that are both more comfortable and sustainable. Moreover, the remarkably straightforward and easily scalable process of carbonation showcases its adaptability for large-scale implementation. This advancement can play a vital role in shaping future urban planning strategies and promoting the adoption of ecofriendly materials in construction.

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