Dear Readers,

we are pleased to share with you an edition themed on "The Future is Circular: Sustainable Construction with Recycled Materials" edited by Dr Vaishali Sahu.

Dr Vaishali Sahu is an Engineering Professional with an overall experience of 16 + Years in Academics and Research in the field Environmental Engineering. Currently, she is Dy. Director, Internal Quality Assurance Cell (IQAC) and Associate Professor & Associate Head, Department of Multidisciplinary Engineering at The NorthCap University, Gurgaon, Haryana. She has obtained her Bachelor's Degree in Civil Engineering from **SGSITS, Indore** and Master's in Environmental Engineering from **IIT Roorkee**. She has done her Ph.D. from The NorthCap University, Gurgaon.

Her area of specialization is solid and liquid waste management, recycle and reuse, waste and resource management, sustainable waste management, water and waste water treatment processes. She has published **over 45 research papers** in reputed peer reviewed National and International journals, 3 books and more than **25 research papers** in conference proceedings. She is serving as a reviewer to various reputed International Journals. She has supervised **4 PhD thesis** and **16 MTech dissertation** and over **20 B.Tech** projects in the area of sustainable waste management, water resource management, pollution and control, environmental geotechnology. She is currently guiding 10 PhD Scholars at NCU.

Dr Sahu has completed one research project titled, "Experimental and Numerical Study of Single Pile Capacity Adjacent to Existing Buried Pipe System" funded by Department of Science and Technology, India with the sanctioned cost of Rs. 25.41 lakhs. She has also completed 2 international projects funded by Cintana Education for USD16000.

Apart from teaching and research, Dr Sahu is contributing to the social community services at large. She believes that volunteering in community service offers us with the prospect to become active members of our community and has a long-term, encouraging impact on society and environment at large. She is making efforts to develop a community of caring and committed individuals at NCU.

Production Editor
Indian Concrete Journal

Dear Readers,

I am pleased as a guest editor of this edition, to be able to present to you these papers related to sustainable construction with recycled materials. This issue showcases selected and extended versions of exceptional research papers originally presented at the international conference on technological innovations in multidisciplinary engineering and sciences (TIMES 2024), held on September 6-7, 2024, at The NorthCap University, Gurugram, Haryana, India. The conference brought together scholars, researchers, and experts from diverse fields to discuss and explore the latest advancements in concrete technology and their applications for sustainable development.

The research papers included in this volume reflect a rich diversity of topics, ranging from use of waste material in concrete to the mechanical attributes and the sustainability potential.

Our first paper[1] is on bacteria-incorporated ternary geopolymer bio-mortar. This study explores the sustainable use of industrial waste in ternary geopolymer bio-mortar by incorporating bacteria to enhance performance. Utilizing fly ash, GGBFS, and metakaolin, the geopolymer is activated with an alkaline solution and enriched with bacteria for improved strength, durability, and self-healing. Results show higher compressive strength, reduced porosity, and autonomous crack repair through microbial-induced calcite precipitation (MICP). The material offers lower CO_2 emissions and promotes circular economy principles. This research demonstrates geopolymer bio-mortar as a viable eco-friendly alternative to traditional cement, with potential for large-scale adoption in sustainable construction.

The second paper is the extensive study by Thakkar *et al.*[2] This study investigates lightweight concrete incorporating e-waste

and submicron ceramic waste as sustainable alternatives to conventional aggregates. E-waste-derived materials enhance strength and density reduction, while submicron ceramic waste improves microstructural integrity and durability. Performance analysis includes compressive strength, water absorption, and thermal conductivity. Results indicate optimized strength-to-weight ratio, reduced porosity, and improved thermal insulation, making it suitable for eco-friendly construction. The study highlights the potential of e-waste recycling in concrete production, promoting waste reduction and sustainability. Future research should explore long-term durability and large-scale applications to support green building initiatives.

The study reported in the third article[3] examines the feasibility of using recycled concrete aggregate (RCA) in non-bituminous sub-surface layers of aircraft pavements as a sustainable alternative to natural aggregates. Laboratory tests assess mechanical strength, durability, compaction characteristics, and load-bearing capacity of RCA-based mixtures. Results demonstrate adequate structural performance, improved drainage properties, and environmental benefits through reduced natural resource depletion. RCA proves to be a cost-effective and eco-friendly solution for airfield pavement layers, promoting circular economy principles. Further research is needed to optimize mix design, long-term performance, and large.

The fourth article[4] explores the enhancement of e-waste incorporated concrete through microbial-induced calcite precipitation (MICP). E-waste serves as a partial replacement for conventional aggregates, while microbial induction improves strength, durability, and self-healing properties. Experimental analysis reveals higher compressive strength, reduced porosity, and better resistance to water absorption and cracking. The MICP process aids in bonding improvement and crack sealing, making the concrete more sustainable and long-lasting. Findings highlight the dual benefits of e-waste recycling and bio-mineralization, promoting eco-friendly construction. Further research is needed to assess long-term performance and large-scale implementation in structural applications.

Our fifth paper by Dagar *et al*.[5] present critical review of the impact of recycled concrete aggregates (RCA) on asphalt mixtures, focusing on engineering properties such as strength, durability, moisture resistance, and workability. RCA, as a sustainable alternative to natural aggregates, influences asphalt's stiffness, fatigue life, and rutting resistance. Key challenges include higher water absorption, lower density, and potential bonding issues, which can be mitigated through proper mix design and surface treatments. The study highlights environmental and economic benefits, promoting circular economy principles in pavement construction. Future research should optimize modification techniques and field performance validation for large-scale asphalt applications.

As we enter a new era, sustainable concrete emerges as a beacon of hope, guiding us toward a greener future. No longer a symbol of environmental impact, it now represents our dedication to sustainability and innovation.

It is a privilege to present this concise summary of the latest advancements in utilizing various industrial by-products in concrete and other binders, showcasing their potential to redefine modern construction.

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