

Dear Readers,

We are pleased to introduce Dr. Bibhuti Bhusan Das who has edited this edition and brings to you research papers on green concrete. He is an Associate Professor at National Institute of Technology Karnataka (NITK), Surathkal, Mangalore and his research areas are microstructure, durability and sustainable practices of concrete. Dr. Das has published over 100 papers in Journals and Conferences and is well-known in both academia and industry.

Wishing all our readers a very happy and a prosperous new year.

Production Editor
Indian Concrete Journal



Dear Readers,

Green concrete is a type of concrete manufactured by using at least one of its constituent as waste material. It is the one such concrete which consumes less energy during its production, or it should provide high performance and life cycle sustainability. To put it in other words, it's simply an environmentally friendly concrete. It has got the potential to improve the keys of sustainability in terms of environmental, economic and social impacts. The criterion to be considered on deciding the green concrete are, the substitution material available for Portland cement, methods and process of concrete manufacturing and impacts on life cycle sustainability. It should follow the three R's i.e. reduce, reuse and recycle techniques in perspective to the science and technology of concrete.

The three important objectives which needs to be considered in the development of green concept in concrete are to bring down the greenhouse gas emissions (CO₂ gas emissions from cement industry), to lessen the utilization of natural resources like limestone, shale, clay, natural river sand and rocks, as these are already under consumption for the development of human mankind which can't be retracted back to earth and the third one is making use of the waste materials in concrete that can reduce the air, land and water pollution.

The materials that can be used for the production of green concrete are waste materials such as blast furnace slag, fly ash, silica fume, recycled glass, wood ash, recycled coarse materials, waste plastic, construction and demolition wastes, foundry sand, stone crusher wastes and etc which can be used as alternate materials in production of green concrete.

The conventional concrete is the most commonly used material in construction, but there is still a possibility of enhancing its physical, chemical and most important, the mechanical properties (Popovics, S. Concrete Materials, 2nd ed.; William Andrew: Norwich,

NY, USA 1992). The properties which are very much needed for making conventional concrete includes compressive, tensile and flexural strengths, consistency, durability and resistance to chemical attacks and sustainability. The research fraternity is focused on developing the concrete by keeping all these things into consideration for various construction purposes. It's not only just the objective of improving the properties of concrete using various ingredients, but also to look further for other alternatives which can be utilized without any negative complications. Out of these, one is definitely of making use industrial by-products as ingredients in concrete or finding out ways of developing novel materials that can fulfill the purpose of sustainability. With the growing time, the idea of studying life problems are somewhat getting innovative, in a similar way the materials are also getting filtered at various scales in order to come up with advanced approaches. Therefore, modifying the development of the materials at nano-scale is being considered as the most effective one with respect to time as it gives enrichment in the hierarchy based simulation of different materials, such as the nano and mesoscale modelling of cement matrix (Yu, Z: Lau, D. Nano-and Mesoscale modeling of cement matrix. Nanoscale Res.Ltt 2015, 10, 173), development of research with respect to the studies focused on new-to-old concrete interface (Qin: Hao, H: Rousakis, T,; Lau, D. Effect of shrinkage reducing admixture on new-to-old concrete interface. Compos. Part B Eng. 2019, 167, 346-355). Researchers also emphasized that bringing the supplementary cementitious materials (SCMs), an industrial waste in conjunction with highly pozzolanic material so called nano-silica leads in the production of high performance and sustainable construction material. Appropriate use of mix design modelling tools which adopts the concepts of particle packing theory will adds on in improving the sustainability aspect in construction and thereby promotes green construction (Snehal K., B B Das., Akansha M., Early age, hydration, mechanical and microstructure properties of nano-silica blended cementitious composites, Construction Builder Material, 2020).

This volume of ICJ contains assorted topics related to experimental and analytical work carried out by various researchers across India that promotes sustainability and green aspects. I on behalf of the entire ICJ team would like to thank the authors for their contribution and to our committed reviewers for their outstanding support provided.

Bibhuti Bhusan Das
Guest Editor, Indian Concrete Journal