

Porous concrete pavement containing nanosilica from black rice husk ash

Ramadhansyah PutraJaya

Department of Civil Engineering, College of Engineering, University of Malaysia
Pahang, Kuantan, Malaysia

ABSTRACT

Rice husk is a waste from the agricultural industry. It has been found that the main inorganic element in rice husk is silica. Rice husk ash (RHA) as a replacement material in the conventional concrete mixture has been widely studied around the world. However, there is a lack of documented research on nano production from RHA used as a replacement cement in porous concrete pavement mixtures. This study employed the top-down approach via dry grinding in a mechanical ball mill to generate a nano-black RHA (nano-BRHA). As a result, nano-BRHA was successfully generated with an optimum duration of 63 hours and median size of 66 nm. The results also indicated that the particle size of BRHA was significantly decreased with increasing grinding time. In addition, the morphology of the nano-BRHA changed with grinding duration. Finally, the use of nano-BRHA produced porous concrete pavement with good strength and permeability, and sound absorption.

KEYWORDS: Nano, rice husk, porous, concrete, pavement, strength

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REFERENCES

- [1] P. Rungruangvirojn, K. Kanitpong, **Measurement of visibility loss due to splash and spray: porous, SMA and conventional asphalt pavements**, Int. J. Pavement Eng., 11 (6) (2010), pp. 499-510
- [2] Y. Chen, K. Wang, X. Wang, W. Zhou, **Strength, fracture and fatigue of pervious concrete** Constr. Build. Mater., 42 (2013), pp. 97-104
- [3] A. Bouikni, R.N. Swamy, A. Bali, **Durability properties of concrete containing 50% and 65% slag**, Constr. Build. Mater., 23 (2009), pp. 2836-2845
- [4] P. Chindapasirt, S. Homwuttivong, C. Jaturapitakkul, **Strength and water permeability of concrete containing palm oil fuel ash and rice husk-bark ash**, Constr. Build. Mater., 21 (2007), pp. 1492-1499
- [5] S.C. Pal, A. Mukerjee, S.R. Pathak, **Investigation of hydraulic activity of ground granulated blast furnace slag in concrete**, Cem. Concr. Res., 33 (2003), pp. 1481-1486