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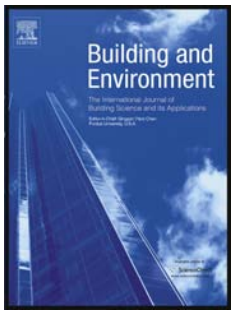

On the colours and properties of building surface materials to mitigate urban heat islands in highly productive solar regions

Hassan Radhi, Essam Assem, Stephen Sharples

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On the colours and properties of building surface materials to mitigate urban heat islands in highly productive solar regions

Hassan Radhi [a, *], Essam Assem [b], Stephen Sharples [c]

[a,*] Global Engineering Bureau, Manama, Bahrain.
[b] Building and Energy Technologies Department, Kuwait Institute for Scientific Research, Kuwait
[c] School of Architecture, University of Liverpool, United Kingdom

Abstract

An experimental study was conducted to assess the impact of building surface materials on urban heat islands (UHI) in highly productive solar regions. The study involved 32 surface materials commonly used in Bahrain and was performed during the summer period. The current work focuses on finishing materials at horizontal surfaces and examines the influence of material thermophysical and solar properties on their surface temperatures (*Ts*) and surface air temperatures (*Ta*) under clear sky conditions. A twofold assessment was deployed: first, experimental measurements of horizontal sample materials exposed to solar irradiation on a flat roof, and the second assessment involved full-scale experiments of roofs with different construction configurations. The analysis showed that the standard error of measurement in measured temperatures for all roofs was less than 3.5 °C, the standard error of mean was between 1.5 and 2.5 °C and the largest difference in standard deviations was 4 °C, indicating low bias. The range of errors in measurements was highest for the temperature of a dark porcelain roof. Overall, the errors were similar over all roofs. This work suggested that white and light colour materials were important to cope with surface UHI, while cool materials were beneficial and sensitive to highly productive solar regions, whereas materials with low heat storage capacity were significant as an atmospheric UHI reducer.

Keywords: Surface materials, surface temperatures, air temperatures, UHI

∗ Corresponding author: Hassan Radhi

e-mail address: h_radhi@yahoo.com

Tel: +93 34116633 - Fax: +973 17586142