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Accession number:20112814134868

Title:Heat induced damage detection by terahertz (THz) radiation

Authors:Rahani, Ehsan Kabiri (1); Kundu, Tribikram (1); Wu, Ziran (2); Xin, Hao (2)

Author affiliation:(1) Department of Civil Engineering and Engineering Mechanics, University of Arizona, Tucson, AZ 85721, United States; (2) Department of Electrical and Computer Engineering, University of Arizona, Tucson, AZ 85721, United States

Corresponding author:Rahani, E.K.(ekabiri@email.arizona.edu)

Source title:Journal of Infrared, Millimeter, and Terahertz Waves

Abbreviated source title:J. Infrared. Millim. Terahertz Waves

Volume:32

Issue:6

Issue date:June 2011

Publication year:2011

Pages:848-856

Language:English

ISSN:18666892

E-ISSN:18666906

Document type:Journal article (JA)

Publisher:Springer New York, 233 Springer Street, New York, NY 10013-1578, United States

Abstract:Terahertz (THz) and sub-terahertz imaging and spectroscopy are becoming increasingly popular nondestructive evaluation techniques for damage detection and characterization of materials. THz radiation is being used for inspecting ceramic foam tiles used in TPS (Thermal Protection System), thick polymer composites and polymer tiles that are not good conductors of ultrasonic waves. Capability of THz electromagnetic waves in detecting heat induced damage in porous materials is investigated in this paper. Porous pumice stone blocks are subjected to long time heat exposures to produce heat induced damage in the block. The dielectric properties extracted from THz TDS (Time Domain Spectroscopy) measurements are compared for different levels of heat exposure. Experimental results show noticeable and consistent change in dielectric properties with increasing levels of heat exposure, well before its melting point.

Number of references:21