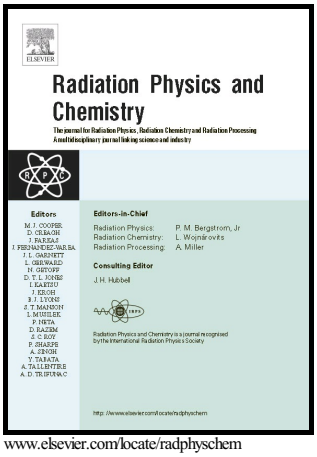
Author's Accepted Manuscript



www.elsevier.com/locate/radphyschem

Non-destructive inspection of hidden corrosion through Compton Back Scattering technique

M. Margret, M. Menaka, V. Subramanian, R. Baskaran, B. Venkatraman

PII: S0969-806X(18)30237-8
DOI: https://doi.org/10.1016/j.radphyschem.2018.07.015
Reference: RPC7943

To appear in: *Radiation Physics and Chemistry*

Received date: 20 March 2018
Revised date: 2 July 2018
Accepted date: 18 July 2018

Cite this article as: M. Margret, M. Menaka, V. Subramanian, R. Baskaran and B. Venkatraman, Non-destructive inspection of hidden corrosion through Compton Back Scattering technique, *Radiation Physics and Chemistry,* https://doi.org/10.1016/j.radphyschem.2018.07.015

Non-destructive inspection of hidden corrosion through Compton Back Scattering technique

M.Margret [a] *, M.Menaka[b], V.Subramanian[a], R.Baskaran[a], B.Venkatraman[c]

[a]Radiological Safety Division, Indira Gandhi Centre For Atomic Research, Kalpakkam-603102, India

[b]Quality Assurance Division, Indira Gandhi Centre For Atomic Research, Kalpakkam-603102, India

[c]Director, Health , Safety and Environment Group, Indira Gandhi Centre For Atomic Research, Kalpakkam-603102, India

***Corresponding author: mag@igcar.gov.in**

ABSTRACT:

The purpose of this study is to investigate the hidden corrosion at selected sites in corrosion simulated Mild Steel using information from the Compton scatterd gamma rays. The proposed non-contact method employs ^{137}Cs source and an HPGe detector as part of practical framework and it is integrated with the MCA system. The scattered gamma rays reflecting the corrosion is mapped in real time during the scanning of the specimen. Point by point scanning is carried out to acquire the pulse height spectrum and datas are used to determine the thickness of known test object and hence thickness calibration is attained. With the calibration as a basis, hidden corrosion at the sub surfaces is detected and analysed. A reconstruction algorithm is explicated for this proposed work with a good precision of corrosion quantification in the subsequent layers. The precision is comparable with the radiography and transmission results. Experimental measurements and their results strongly confirm, hidden corrosion upto a depth of 4mm (with a range of corrosion from 1.76 to 2.29mm) in Mild Steel could be detected.

KEYWORDS: Compton Scattering , Hidden Corrosion, Mild Steel, HPGe Detector, Transmission, Radiography.