

Non-Destructive Methods for Evaluation Properties Materials and Devices in Renewable Energy

V. Redko*, E. Shembel, V. Khandetsky, Y. Sohach, T. Pastushkin, O. Redko

*ENERIZE CORPORATION, 4956 Rothschild Dr.
Colar Springs, Florida, 33067-4134*

Improvements in design and manufacture of devices for photonics and renewable energy requires a new non-destructive methods for evaluation and quality testing. Enerize Corporation develops and commercializes proprietary non-destructive test (NDT) methods and systems for non-contact evaluation the properties of nanostructured powders and thin films, semi-products, and final products based on the following methods: Electromagnetic Eddy-Current and Capacitance; Ultrasonic Echo and Pulse Shadow; Holographic Interferometry; High Voltage Gas Visualization; Combined Methods.

The non-contact feature of these methods allows in-line quality control during synthesis of component materials as well as during production and final assembly of batteries, supercapacitors, solar cells, etc. Application of these systems results in improved product reliability and safety, while lowering overall manufacturing costs by reducing wastage and preventing defective components from being incorporated into the finished product.

A number of mathematical tools are used for process description and modeling, for signal processing, and for generating properties control information based on analysis the dependences between the parameters the fields that are applied and the electro-physical characteristics the test article that measured. These include: mathematical descriptions of elastic waves in isotropic and anisotropic media; Maxwell's and Laplace's equations; mathematical tools for spectral transformations in different orthogonal bases; methods of defect identification and the processing and analysis of images using fuzzy logic and artificial neural networks.

During presentation will be presented NDT methods and systems developed by Enerize for the following

e-mail: eshembel@enerize.com

electromagnetic testing to determine specific conductivity, electromagnetic properties and composition of powdered materials; non-contact nondestructive electromagnetic testing to determine specific conductivity of thin films (transparent conductive oxides for solar cells, solid and polymer electrolytes, polymer membranes for fuel cells, etc.); non-contact electromagnetic testing to determine the interface resistance between current collector and active electrode mass; non-contact holographic interferometry to determine defects in solar cells, batteries and other devices; nondestructive determination of defects in multilayer structures based on combined ultrasonic and electromagnetic methods (e.g., "jelly-rolls" for batteries and supercapacitors); gas-discharge visualization system for hermetic seal quality control using visualization of the device images on a computer screen.

Some examples of non-destructive equipment presented below.

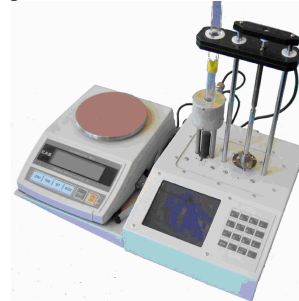


Fig. 1 Enerize EC-100PM Powdered material bulk non-contact conductivity meter. Powder placed inside of glass volume. Electromagnetic transducers placed outside of glass volume.



Fig.2 Enerize Holographic Interferometry System EC-111HIS for hidden defects test

- [1] V. Redko et al. US Patent No. 7,071,684
- [2] V. Redko et al. US Patent No. 7,288,941
- [3] V. Redko et al. US Patent No. 7,355,395
- [4] V. Redko et al. US Patent No. 7/498,817