

Advanced characterization by neutron beam techniques in the medical and industrial fields

Massimo Rogante

Rogante Engineering Office, Italy, www.roganteengineering.it

main@roganteengineering.it

ABSTRACT

The adoption of neutron beam techniques (NBT), as non-destructive and non-invasive diagnostics, is becoming more and more relevant in studying materials and components of both medical and industrial interest. This paper deals with the advanced characterization by NBT, in particular at the micro- and nano-scale level, of medical devices and industrial parts. Several invasive medical devices, e.g., once implanted in the human body, as programmed to remain there for the whole patient's life, are subjected to the ionic environment of the blood and the substances and cells that secrete, as well as other aging factors. The self-expandable stent, installed in arteries such as the carotid to correct a stenosis, are also subjected to dynamic stress of the pulsation. The progress of such devices, as well as the possible improvement of materials and parts belonging to the industrial field, directly depend on the application of effective characterization methods to assess damage due to aging, in order to establish the correct relationship between the characteristics of defects and functional macroscopic properties. NBT contribute to the solution of important questions and problems related to the methodological restrictions of the analysis techniques normally used: for applications in the medical and industrial fields, the Rogante Engineering Office has developed particular methodological approaches with dedicated processing and treatment procedures. Complementary to the classical investigation methods, NBT can supply an important help in improving existing materials and devices and producing original and innovative components for different types of applications, with optimization of quality, functionality and performance.

BIOGRAPHY

Dr. Ing. Massimo Rogante, B.Eng.(Mech), Nucl. Eng. Ph.D., is the Director of the Rogante Engineering Office, operating primarily in Industrial Applications of Neutron Techniques. He has been working in the neutron field for about 30 years. He is Member of the International Scientific Advisory Committee of the Budapest Neutron Centre, the Scientific Selection Panel of the Centre of Accelerators & Nuclear Analytical Methods (Nuclear Physics Institute of the Academy of Sciences of the Czech Republic) and various other international and domestic scientific bodies, academies and projects. He published more than 300 papers and attended several International Conferences and Workshops as invited lecturer, Member of the Scientific Committee and Co-organizer.



- LinkedIn: www.linkedin.com/in/massimo-rogante/
- Skype: [roganteengineeringoffice](https://www.skype.com/people/roganteengineeringoffice)
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