

NANO-SCANNERS APPLICATIONS

In industry, the quality of products, ageing of components and structures into operation remain a major concern of manufacturers and users. Indeed, operating safeties are the main issues for different sectors of industry.

Early detection of defects is essential for the durability of materials and structures since they have a direct impact on the lifetime of component in operation. The sensitivity of the methods of non-destructive testing (NDT) currently used does not allow to anticipate the emergence of defects or the propagation of microscopic cracks within the material.

Today, we present a new non-destructive testing technology based on the penetration of microwaves that solves these problems. It will exist in 3 forms.



The local probe Nano-scanners allow the detection of nanometer-sized defects in depth. These Nano-scanners push the defect detection thresholds, improving the quality and the durability of materials by the application of preventive treatments. The Nano-scanners are able to observe surface and sub-surface defects (up to 100 microns), residual stresses, the light chemical elements diffusion, and micro-structural changes on different materials (as in metals, ceramics, polymers, glasses, fluids and powders) with a resolution below 100 nm.



Dimensional control

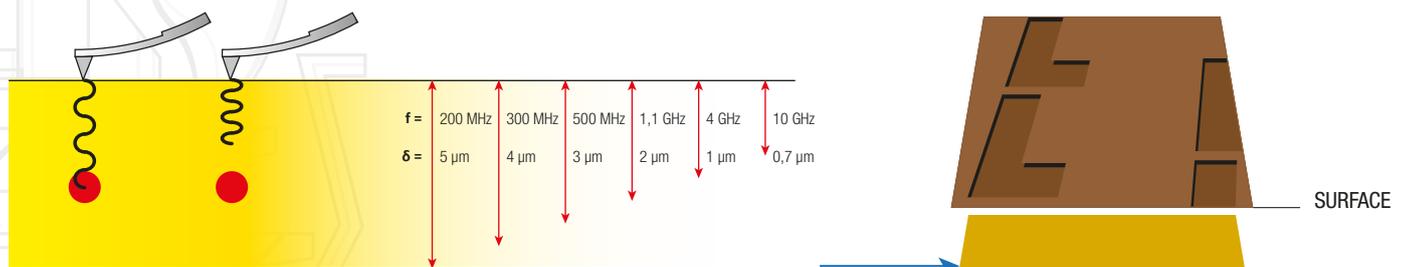


fig.1 Correlation between frequency and depth of investigation

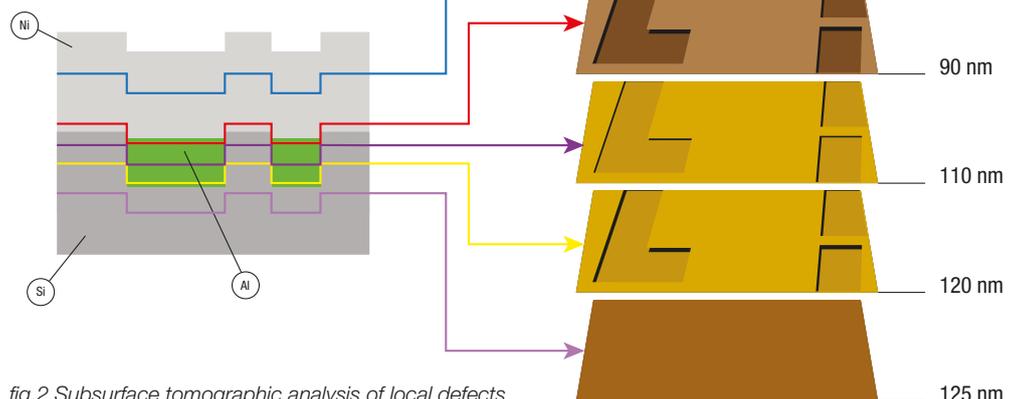


fig.2 Subsurface tomographic analysis of local defects buried in function of the materials



Residual stresses

The nano-scanners allow to determine the residual stresses profiles in materials.

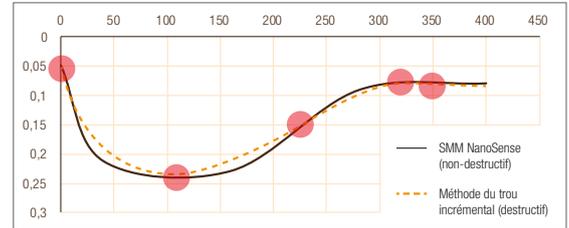
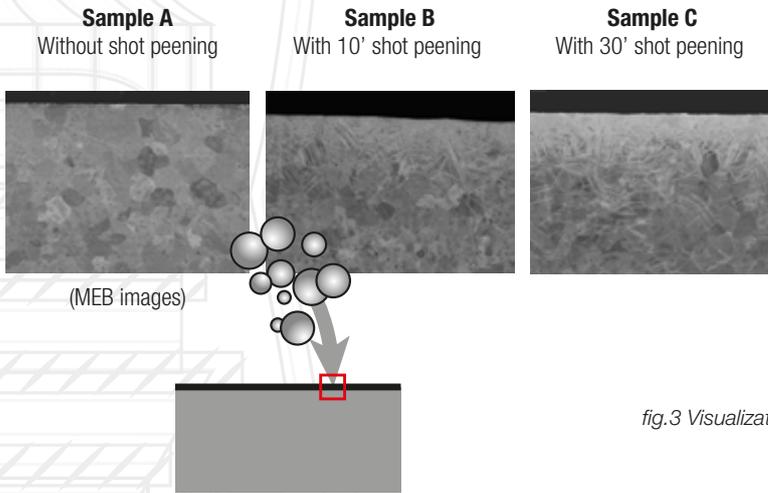


fig.3 Visualization of structural changes and stresses suffered by materials.



Light chemical elements

The Nano-scanners highlight the identification and early detection of damage in materials and structures at surface and subsurface level. Below, an example of light chemical elements detection related to the phenomenon of the zirconium oxidation.

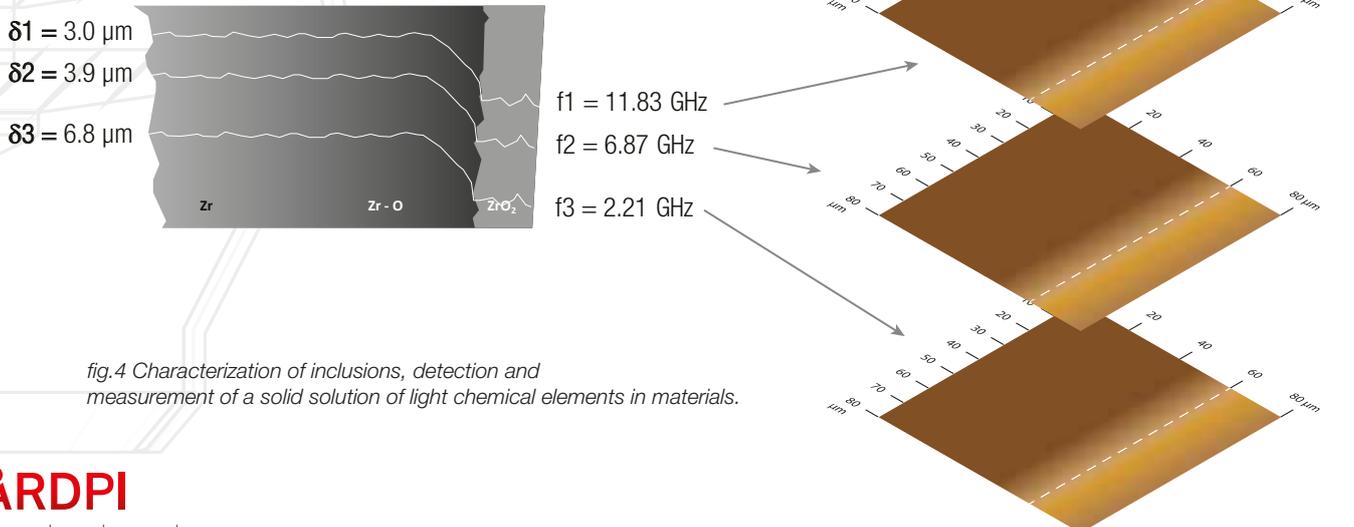


fig.4 Characterization of inclusions, detection and measurement of a solid solution of light chemical elements in materials.

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