

EDXRD

ENERGY DISPERSIVE X-RAY DIFFRACTION TO IDENTIFY TISSUES

+ WHAT IS EDXRD?

The EDXRD technique exploits the Bragg law by fixing the diffraction angle ($<5^\circ$) and by scanning the energy range with a polychromatic spectrum and an energy resolved detector.

- EDXRD systems can use powerful **conventional X-ray tubes** and **commercial** multi-pixelated detectors to inspect a 2D plan of an object in one shot.
- Diffraction provides very **specific material signature**, reflecting the molecular and atomic structure of inspected materials (solids and liquids) **not available with conventional X-ray scanning**.

+ APPLICATIONS

- **Medical:** precise diagnostic of breast tumors to dispel doubt after a mammography
- **Counterfeit:** identification of counterfeit medicine in luggage or parcels
- **Security:** in luggage (cabin or hold) or parcels
 - Detection of explosives: solid (TNT, TATP) or liquids (nitromethane, H₂O₂)
 - Detection of narcotics
- **Nondestructive Testing:** detection of metal stress

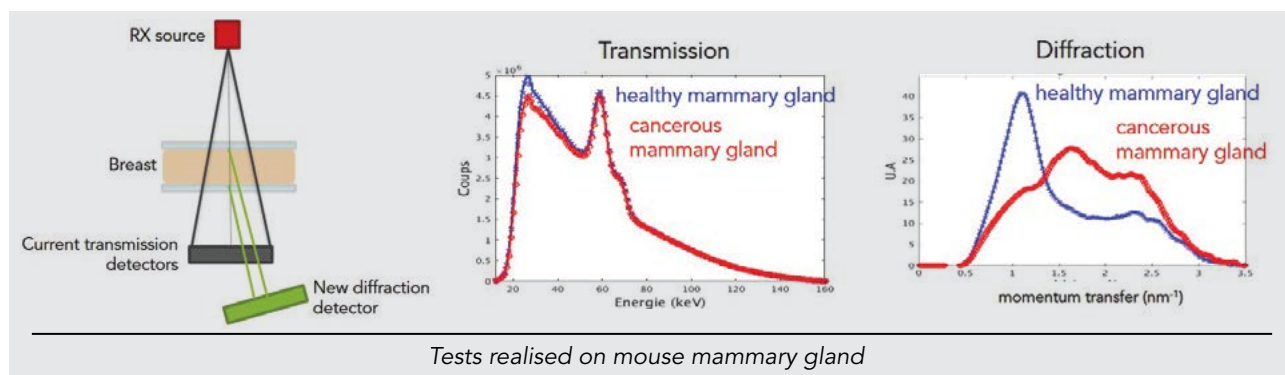


+ WHAT'S NEW?

- **New detector technology** based on room temperature semiconductor crystal (CdTe/CZT) combined with optimized low noise front-end electronics to provide high energy resolved EDXRD spectra.
- **Simulation package** DERiX-lab, capable of modeling the whole diffraction chain (including geometry, collimators, detectors, diffraction physics) to dimension any new EDXRD system.
- Specific detector-level and spectrometric material discrimination **processing methods** (algorithms) to provide the signature of each material with the best accuracy.
- **Experimental EDXRD lab bench**, with flexible geometry (collimation, angle, distances).



+ LETI'S RESULTS



+ WHAT'S NEXT

- **Medical:** test with real biological tissues
- **Counterfeit:** test of drug counterfeit in real settings with customs services
- **Security:** enhance sensitivity with a more open spiral

PUBLICATIONS & COMMUNICATIONS

D. Barbes and al, « Material-specific imaging system using energy-dispersive X-ray diffraction and spatially resolved CdZnTe detectors with potential application in breast imaging », in Nuclear Instruments and Methods in Physics Research, Volume 848, 11 March 2017, Pages 91–98.

INTERESTED IN THIS TECHNOLOGY?

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