

عنوان مقاله:

Introducing an Optimized Method for Obtaining X-ray Diffraction Patterns of Biological Tissues

محل انتشار:

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خلاصه مقاله:

Introduction Individual X-Ray diffraction patterns of biological tissues are obtained via interference of coherent scattering with their electrons. Many scientists have distinguished normal and cancerous breast tissue, bone density, and urinary stone types using the X-Ray diffraction patterns resulting from coherent scattering. The goal of this study was to introduce an optimized method for obtaining X-ray diffraction patterns of different types from biological tissues. **Materials and Methods** A special tool constituting primary and scatter collimators as well as a sample holder was designed and built. All measurements were done using an X-ray tube, the above-mentioned tool, and a semiconductor detector (HPGe). The X-ray diffraction patterns of some tissue-equivalent materials (acrylic, polyethylene, nylon, and calcium carbonate) and biological tissues (adipose, muscle, and bone) were obtained. **Results** The corresponding peak positions for adipose, muscle, bone, acrylic, polyethylene, nylon, and calcium carbonate in corresponding X-ray diffraction patterns are located in 1.1 ± 0.055 nm⁻¹, 1.41 ± 0.072 , 1.6 ± 0.08 nm⁻¹, 0.8 ± 0.04 nm⁻¹, 1.03 ± 0.051 nm⁻¹, 1.22 ± 0.061 nm⁻¹, and 1.7 ± 0.085 nm⁻¹, respectively. **Conclusion** The X-ray diffraction patterns obtained in this study were in good agreement relative to previous measurements in terms of peak position. This study introduces a useful setup for extraction of X-ray diffraction patterns from different biological tissues.

کلمات کلیدی:

Biological Tissues, Coherent Scattering, X-Ray diffraction

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