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Virtual X-Ray Diffractometer using acoustic wave for material science education

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In this research, virtual X-Ray diffractometer (XRD) using acoustic wave for material science education has been proposed. Acoustic wave with frequency in ultrasonic range has been used to characterize acoustic crystal structures. The dimensions of these model structures, which are in order of ultrasonic wavelength region, have been formed by three dimensional printer (3D printer) and cotton swab. The angle of ultrasonic source and detector have been swept to record reflected wave signal of each angle. The peak of each angle have been selected to calculate lattice spacing by Bragg's law and then compared with the implemented structure. The results show signal peaks of each diffracted angle and each structure model. The experimental results showed that the lattice spacing values obtained from acoustic experiment were in good agreement with the measured values of the implemented structures. This virtual XRD system provide to be an efficient tool for understanding about crystal structure characterization.

Author: Dr PLAIPICHIT, Suwan (Srinakarinwirot University)

Co-authors: Dr WICHARN, Surawut (Srinakarinwirot University); Dr PUTTHARUGSA, Chokchai (Srinakarinwirot University); Dr WANAKAMOL, Panitan (Srinakarinwirot University); BURANASIRI, Prathan (King Mongkut's Institute of Technology Ladkrabang)

Presenter: Dr PLAIPICHIT, Suwan (Srinakarinwirot University)

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