which for an non-absorbing crystal are quite independent of each other. The absorption is thus a unique link which interlaces these two states in the absorption effect. v) Absorption and refraction in this model of scattering are two distinct phenomena, which means that there is no necessity to introduce a complex index of refraction for absorbing crystals. The calculated absorption profiles reproduce the experimental results without the necessity of the corrections usually made by means of additional and arbitrary parameters.

PS15.07.05 ADVANTAGES OF X-RAY REFLECTOMETRY EXPERIMENTS USING GÖBEL MIRRORS. P.J. LaPuma, Siemens Analytical Instruments, Madison, WI

X-ray reflectometry is a very useful tool for characterizing thin films deposited on substrates. It provides highly accurate and nondestructive characterization of thin films and layer packages in the thickness range between 1 and 300nm. However, the sample properties determine the amount of information that can be obtained from the sample. High surface roughness and coatings with large electron densities will cause relevant information to become obscured soon after the total reflection plateau due to absorption and diffuse scatter. The only way to obtain information from these types of samples was to increase the measurement time in order to obtain better counting statistics, or make the measurement at a synchrotron light source. With Göbel Mirrors these measurements are now possible in the laboratory. Göbel Mirrors provide a higher flux and a parallel beam that is ideal for these measurements. Bragg peaks from repeating multilayers as well as oscillations from rough samples can now be seen at high angles.

PS15.07.06 CONTROL OF X-RAY DIFFRACTED AND X-RAY FLUORESCENCE BEAMS (TRANSMISSION OF SPEECH). Navasardian M.A., Gabrielian R. Ts., Mkrtchian V.P.; Physics Department of Yerevan State University, Al. Manoukian 1, Yerevan 375049, Armenia

The double modulation of X-ray beam for the purpose of transmission of signals [1] was a new step in X-ray diffraction studies. In investigations that followed two important results were obtained: under temperature gradient a pumping of primary beam energy into the direction of reflection [2] was observed, and a transmission (reception) of information, in particular of speech was realized by the Laue-diffracted beams [3].

In the present work the double modulation of X-rays at different values of wavelengths of X-rays, at different powers of X-ray tubes, and at different thickness of crystalline plate ($0.15 \leq \mu t \leq 10$) as well as the modulation of X-ray fluorescent radiation for different atoms has been investigated.

The following results were obtained:

1. At double modulation both by anomalous transmitting beams (Ga(220), $\mu t \geq 10$) and by diffracted beam in the direction of incidence (at $\mu t \leq 1$), the transmission of vocal signals (speech) is impossible. This is due to the fact that the intensity I of these beams decrease as the amplitude of electrical (acoustic) oscillations U applied to the modulator are increased. That is, I(U) is a decreasing function, while for proper operation of transmission systems I(U) should be an increasing function.

2. The double modulation of beams from low power sources (8W) will permit to use X-ray tubes without the cooling of anode.

3. Using the modulated X-ray beam we have obtained low-frequency (speech) echo from deep energy levels of the atom. At the excitation by Mo Kα radiation 30 atoms with different **Z** were used, the energies of K or L absorption edges were less than the energy of photons of Kα line of Molybdenum.

4. It will be submitted the improved scheme of the equipment for the transmission and reception of information by double modulated X-rays.

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