LITERATURE CITED

1. P. W. Bridgman, Proc. Amer. Acad. Arts and Sci., 81, No. 4, 169 (1952).
2. P. W. Bridgman, Proc. Amer. Acad. Arts and Sci., 76, No. 3, 55 (1948).
3. P. W. Bridgman, Proc. Amer. Acad. Arts and Sci., 74, No. 13, 425 (1942).
4. G. C. Kennedy and P. N. La Mori, Progress in Very High Pressure Research, John Wiley and Sons, New York (1961).


# USE OF THE ÉG CAMERA FOR KINEMATIC ELECTRON DIFFRACTION PHOTOGRAPHY


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The adaptation of the ÉG electron diffraction camera for kinematic photography is described. For studying processes occurring at different rates, provision is made for varying the displacement velocity of the plate in four steps. The sharpness of lines and the resolution are not inferior to those in ordinary electron diffraction patterns, and they are sometimes even higher. The specimen is fastened on a tantalum heater, which is heated by current to 600°C during photographing. The distorting effect of the current's magnetic field on the diffraction pattern has been eliminated.

The described method was used for investigating the Cu – Se, Bi – Se, and Ni – Se systems. We identified the phases that developed at the beginning of the process and the phase transitions occurring during the annealing of the specimen in vacuum, which are explained by the evaporation of selenium.


In comparison with x-ray waves, the characteristic property of electron waves is their intensive scattering by the material. Due to this property, the exposure time of electron diffraction patterns is measured in seconds, while the exposure time of roentgenograms is measured in hours. This makes it possible to record continuously the diffraction pattern on a moving photographic plate or film, i.e., to produce kinematic electron diffraction patterns. By using such electron diffraction patterns, we are able to follow changes in the specimen under investigation while it is heated and to study in detail and without missing the intermediate states the processes of crystallization, reactive diffusion, phase formation, and phase transformation in thin layers.

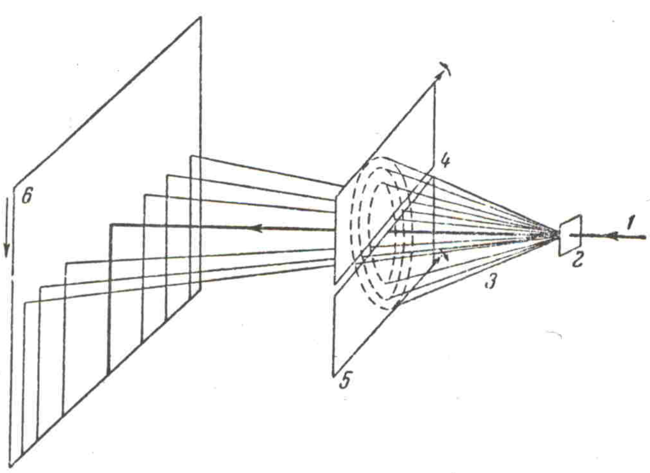

Fig. 1. Arrangement for kinematic photographing. 1) Electron beam; 2) specimen; 3) diffraction cone; 4) slit; 5) shutter; 6) moving photographic plate.

In [1, 2], special equipment was used for producing kinematic electron diffraction patterns of thin films and for studying the phase transitions in the Cu – Al system as well as the crystallization of germanium layers obtained by evaporation. The principles of this method and some critical estimates of its possibilities were briefly presented in [3]. By using the horizontal ÉG electron diffraction camera [4], we developed a simple method for producing kinematic electron diffraction patterns [5], and we investigated the processes of phase formation and phase transformation in certain binary systems.