

Study on the Measurement Methods of Photoconductivity in AgBr Microcrystals Using Microwave Techniques

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Silver halide crystals, such as AgBr and AgCl systems, are used widely in photography and hard copy as the photosensitive materials of high sensitivity and high image quality. In these materials, the silver halides are used in the form of microcrystals and the image is recorded through the formation of latent image specks in exposed microcrystals. Therefore, it is important to know the mechanism of formation of the specks for the developments of more sensitive materials. In this study, a microwave apparatus was developed which is useful to analyze the mechanism through the photoconductivity measurements of the microcrystals. Since the measurements with microwave requires no ohmic contacts on the sample and reduce the amplitude of oscillatory motion of carriers induced by a.c. electric field, even microcrystals can be used as the samples. By this study using primitive AgBr microcrystals, it was found that photoconductivity decrease abruptly along with the formation of latent image specks during exposure and that the presence of the specks decreases the photoconductivity less than one order of magnitude. The former can be utilized to know the exposure value required to form the speck, the latter to detect the presence of the specks. Thus, the inherent characteristics of the materials can be know by those measurements without usual chemical development process.

Some of this study has been utilized to the study and the development of photosensitive materials by the manufacturers. Since the developed measurement methods become a powerful means to analyze the detailed mechanism of formation of the specks, it is expected that they greatly contribute on the improvement of silver halide photosensitive materials.