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The Joint US-Japan Conference on "Processes and Intermediates in the Radiation Chemistry of Condensed Phases". St. Catalina Island. California, U.S.A. Feb 4-11, 1973

Radical Migration in Polymer Matrices

J. SOHMA

It was found that the septet ESR spectrum of allylic polyethylene radical was converted to the octet by visible light irradiation and the octet changed into the sextet, which is the spectrum of the alkyl radical of polyethylene by slight heat-treatment and this sextet reverted back to the original septet. These changes in ESR spectrum demonstrate that the end radical $\begin{array}{c} H\ \ H\ \ H \\ HC-C-C\sim \\ H\ \ \cdot\ \ H \end{array}$ was formed from the allylic radical by visible light and that the end radical changed into $\begin{array}{c} H\ \ H\ \ H\ \ H \\ HC-C-C-C\sim \\ H\ \ H\ \ \cdot\ \ H \end{array}$ by the heat treatment. The reverting to the original spectrum indicates that the allylic radical has a somewhat higher stability than either end radical or alkyl. This conversion of the radical species strongly suggests that an unpaired electron migrates along the polymer chain, viz. the radical migration. It was pointed out that this mechanism of radical migration constitutes a firm basis for the close relation between the decay reactions of polymer radicals in solid matrices and the molecular motion of the polymer in the matrices. A model for this radical migration was proposed.

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Structure of the Trapping Site for Electron in Alkaline Ice

J. SOHMA

By means of the resolution enhanced technique, broad ESR spectrum of the trapped electron produced by γ-irradiation in alkaline ice was successfully resolved into a quintet having binominal relative intensities. The quintet spectrum was confirmed by computer simulation. The separation of the quintet was found to be 4.7±0.5 G. The quintet indicates that a trapped electron is surrounded by the equivalent hydrogens, which presumably occupy apices of a tetrahedron around the trapped electron. That is, one of the two OH bonds of each molecule of the four nearest water molecule is directed

to the trapped electron and forms a trapping site. Based on the Fueki's theory the distance between the trapped electron and each oxygen of the nearest water molecules was determined to be 1.77 Å from the observed separation of 4.7 G.

Second International Conference on Programming Languages for Numerically Controlled Machine Tools Budapest, Hungary. 10 April, 1973

Tips-1; Technical Information Processing System for Computer-Aided Design, Drawing and Manufacturing

Norio OKINO, Yukinori KAKAZU, and Hiroshi KUBO

A software system which can collectively execute CAD and CAM in a through-process is reported in this paper. This system is based on the new methodologies "Pattern description by set function" and "Penalty method for pattern processing" and is intended for practical use.

ICO Symposium on "100 Years of Abbe's Theory", Aalen, West Germany June 12–16, 1973

Hologram-Filters for Spatial Differentiation

Kazumi MURATA, Hirofumi FUJIWARA and Toshiaki SUKEDA

Optical differentiation plays an important role in optical image processings. In order to perform the differentiation optically, the spatial frequency filter should have a transfer function proportional to the spatial frequency. However, one difficulty in producing this filter is encountered because of a negative value for a negative spatial frequency. The differentiation filter is constructed by several means of simple holographic techniques for overcoming the above difficulty from a view-point that it is regarded as a moiré pattern of two interference fringes having slightly different spatial frequencies. The differentiation limit is inversely proportional to the period of the moiré pattern of the filter. Characteristics of the filter were studied theoretically and experimentally in detail to a certain extent and the differentiation filter was applied for image deblurring.

Period of the Meeting July 18-20, 1973
Name of the Meeting, Fifth International Symposium on Acoustical Holography and Imaging, Palo Alto, U.S.A.

Image Reconstruction by Computer in Acoustical Holography

Yoshinao AOKI

Summary

A technique to reconstruct images from acoustical holograms by computer was discussed. The technique discussed here was found to be more useful than the conventional computer image reconstruction technique with special regerd to the fact that the hologram data of an arbitrary sampling number can be processed, whereas in the conventional technique the sampling number is restricted to 2^{2n} (where n is a non-negative integer). Since most of the acoustical holograms are Fresnel transform holograms, the image can be reconstructed by calculating the Fresnel transform of the hologram. An algorithm to calculate a two-dimensional Fresnel transform with sampled hologram data of an arbitrary sampling number was developed and applied for numerical image reconstruction by computer.

Some discussions of the criteria concerning the sampling number and an available aperture for the shifted image were conducted. In calculating the discrete Fresnel transform of hologram with the aid of the fast Fourier transform (FFT) algorithm, periodic images appear under certain circumstances due to the FFT algorithm. Discussion of the periodic image was also conducted.

For experimental discussion acoustical holograms were constructed with a sound-wave of 15 kHz by simulating the reference wave electronically. Images were reconstructed from the photographically recorded holograms according to the algorithm developed in this paper and the validity of the theoretical analysis was examined.

Period of the Meeting July 18–20, 1973
Name of the Meeting, Fifth International Symposium on Acoustical Holography and Imaging, Palo Alto, U.S.A.

Optical Processing of Anamorphic Holgrams Constructed in an Ultrasonic Holography System with a Moving Source and an Electronic Reference

Takashi IWASAKI and Yoshinao AOKI

Summary

In scanned-type holographies, anamorphic holograms are recorded based on the relative movements of the source, object and receiver. In this paper a technique to reconstruct images from such anamorphic holograms by using a cylindrical lens is proposed and theoretical analysis on the proposed optical processing technique is conducted. Two conditions, that is, the same focusing distances and same magnification ratios with respect to the Cartesian coordinates are necessary to reconstruct an image of a planar object in an ordinary holographic system. These conditions are not simultaneously satisfied in the image reconstruction process from anamorphic holograms; hence a technique is required to reproduce correct images. Reducing a hologram with different reduction ratios with respect to the Cartesian coordinates in optical reconstruction process is one example as discussed by the authors in a Gabor-type ultrasonic holography method. Since the technique to adjust only the reduction ratios is not sufficient to process the anamorphic holograms constructed with electronically simulated references, an optical processing method using a cylindrical lens is adopted, which leads to properly reconstructed images. An experiment to construct holograms with 1 MHz ultrasonic wave using a one-dimensional PZT transducer array is conducted and optical reconstruction of images was done according to the proposed processing to examine the theoretical discussion.