# Volumetric image with micro cloud voxels excited by femtosecond laser pulses

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A volumetric display gives three-dimensional (3D) images by forming volumetric pixels (voxels) in space. The voxel is formed as points to shape images. They can satisfy human depth perception and can display a 3D image that can be viewed from a wide field of view with the naked eye. Two types of display implementation methods have been proposed: emission type, in which voxels themselves emit light, and scattering type, in which voxels are visualized by introducing illumination light. In particular, the scattering type has an advantage in the colorization of the image because the color of voxels can be changed only by changing the color of the illumination light. Various systems use rotating screens water drop as voxels for the light scattering type. A micro cloud voxel is formed in a cloud chamber filled with air and supersaturated vapor. It was initially developed as a tool to observe the trajectory of charged particles. When a femtosecond laser is focused and irradiated inside a cloud chamber, its high peak intensity induces multiphoton excitation, exciting and ionizing air molecules such as nitrogen and oxygen. The air ions attract and condense supersaturated alcohol molecules, generating tiny water droplets (micro cloud voxels) near the focal point. In this study, we aim to clarify the formation process by irradiating a cloud chamber with a femtosecond laser pulse and observing the micro clouds that are generated with a high-speed camera. We propose a volumetric display in which clouds are generated by irradiating a cloud chamber with focused femtosecond laser light as voxels.

Short biography:

Keisuke Numazawa was born in 2001 in Koga, Ibaraki Prefecture. He graduated from Saitama Prefectural Kasukabe High School in March 2019 and entered Utsunomiya University in April. In 2020, he moved on to the Information Electronics and Optics Course in the Faculty of Engineering. He is a member of Hayasaki Laboratory in Center for Optical Research and Education (CORE). His research field is volumetric display.