Density measurement of metallic liquid by X-ray radiography

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Equations of state of iron bearing metallic liquids are important to know the composition of outer core of the Earth. We have tried to measure the density of liquid in Fe-S system at high pressure by using X-ray radiography. Experiments were carried out at the BL04B1 beam line at SPring-8, Hyogo, Japan. A high-resolution X-ray CCD camera enabled us to measure the volume of sample from X-ray image precisely. We obtained the volume of Fe-S liquid at high temperatures up to 5 GPa. Because the density at the solid state is obtained by X-ray diffraction data, the relationship between the sample volume from the image and the density can be determined. By using this relationship, the density of metallic liquid is calculated from the sample volume.