Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Elastic properties of methane-propane mixed gas hydrate under high pressure SHINYA MIWA, MASAKI KANOU, TETSUJI KUME, SHIGEO SASAKI, Department of Materials Science and Technology, Gifu University — Methane hydrate (MH) is widely observed in Earth's environment such as permafrost and deep sea floors. At low temperature and low pressure conditions, pure MH crystallizes a cubic structure I (sI) which consists of hydrogen-bonded two small and six medium water cages which enclathrate methane molecules as guests. However, actual MH in deep sea deposits contains not only methane molecules but also ethane and propane molecules. Therefore, the estimation of elastic properties and mechanical stability for both sI and structure II (sII) are required for the safe extraction of methane gas from the deep sea floors. The purpose of this study is to determine the elastic properties of methane-propane mixed gas hydrate (MPH) with sII by applying the high-pressure Brillouin spectroscopy to a single crystal of MPH-sII grown in a diamond anvil cell. The obtained elastic constant C_{11} of MPH-sII showing independent of pressure is obviously different from that of pure MH-sI. On the other hand, the C_{12} and C_{44} are similar to MH-sI. The present results suggest that a variety of gas hydrates have the individual elastic properties and stability depending on the gas hydrate structures.

Shigeo Sasaki
Department of Materials Science and Technology, Gifu University

Date submitted: 22 Feb 2013 Electronic form version 1.4