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Investigation of a laser-produced bismuth plasma soft X-ray source[1] TAKAMITSU OTSUKA, University College Dublin, Utsunomiya University, PADDY HAYDEN, FERGAL O'REILLY, EMMA SOKELL, PADRAIG DUNNE, GERRY O'SULLIVAN, University College Dublin, NOBORU YUGAMI, Utsunomiya University — The emission spectra of many high-Z plasmas, with Z close to or greater than 50, are dominated in the soft X-ray region by a bright spectral feature known as an Unresolved Transition Array (UTA). This feature is attributed to hundreds of thousands of near-degenerate resonance lines from $4d-4f$ and $4p-4d$ type transitions. According to previous work, it was shown that the UTA peak wavelength depends on atomic number and will therefore extend down towards the water window region for high atomic numbers. In our previous paper, emission spectra from Bi plasma were observed to have a UTA peak around 4 nm. Calculated results also showed that there is strong UTA emission at 3.3 nm for plasma temperatures higher than 900 eV. However, this UTA emission has yet to be observed. Possible reasons for not observing this feature are the optical thickness of the Bi plasma itself and an inability to reach a sufficiently high plasma temperature. In order to obtain information on the optical thickness, absorption spectroscopy was carried out by way of the dual laser plasma photoabsorption technique. Two Nd:YAG lasers were focused on planar W and Bi targets. Emission from the W plasma was used to backlight Bi plasmas. Both emission and absorption spectra will be shown in the presentation.

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