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10.55 Development of thermal image plate using ceramics luminescence materials for aligning and stabilizing beam axis of CO2 laser

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CO2 laser interferometer is one of the most important diagnostics to evaluate line averaged electron density of magnetic confinement plasmas. In order to align and stabilize the beam axis, the beam axis and profile should be monitored. So far, a thermal imaging plate (TIP) on the market (Macken instruments Inc.) has been used as the beam profile monitor. This TIP is using thermal quenching effect. However, the commercial TIP cannot be used for a long time ($\tilde{1}$ day) because the commercial TIP discolors from yellow to black by the ultraviolet light ($\lambda^{\tilde{-}}$ 360 nm) for excitation. In addition, the commercial TIP is burnable. These characteristics are not appropriate for the use in a radiation controlled area. In order to resolve these problems, the thermal imaging plate using a ceramics luminescence material which is excited by visible light has been developed for visualizing a CO2 laser beam. One of the promising ceramics luminescence materials is CaAlSiN3:Eu2+, which is excited by blue light ($\lambda^{\tilde{-}}$ 450 nm) and emits red light ($\lambda^{\tilde{-}}$ 680 nm). A fireproof characteristic of the CaAlSiN3:Eu2+ TIP has been confirmed. Moreover, the beam diameter evaluated by the CaAlSiN3:Eu2+ TIP has been approximately same as that evaluated by the commercial TIP.

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