The soot formation characteristics of a lab-scale pulverized coal flames were investigated by using the carefully controlled laser diagnostics. The soot volume fraction and presence of pulverized coal particle were measured simultaneously by laser induced incandescence (LII) and Mie scattering imaging, respectively. In addition, the radial distributions of the soot volume fraction with OH radical, gas temperature and oxygen concentration obtained our previous studies were compared. The results indicated that the laser power for the LII measurement should be controlled carefully to deal with pulverized coal flames. To measure the soot formation of coal flames precisely using LII, it is necessary that the laser energy should be adjusted to satisfy not only the condition being enough energy for heating all soot particles up to the sublimation temperature but also the condition being sufficiently low to avoid too much morphology change in soot particles and superposition of the LII signal from coal particle upon the LII signal from soot particles. The radial position of the LII peak signal intensity was located between the peak Mie scattering and OH radical values. The coexistent region of LII, OH radical and Mie scattering expanded with increasing height from the burner port. It was also found that the soot formation of coal flames was needed to satisfy the conditions of high temperature, low oxygen concentration and the existence of coal particles at the same time.

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