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Influence of sheath fields on hot electron emission from small foils irradiated by intense laser pulses[1] TOSHINORI YABUUCHI, HIDEAKI HABARA, TSUYOSHI TANIMOTO, KAZUO A. TANAKA, Graduate School of Engineering, Osaka Univ., TATSUFUMI NAKAMURA, KUNIOKI MIMA, Institute of Laser Engineering, Osaka Univ. — Strong sheath fields are excited around a rear surface of foils because hot electrons depart from foils irradiated by intense laser pulses. The field strength can be weakened because of a spreading of field-excited region caused by the charge flow on the foil surface. The field can inhibit the hot electron emission from the foils, therefore, the field strength has an influence on the emission number of hot electrons. The effect of field spreading on the electron emission is studied using foils with different areas. The signal intensity of hot electrons is reduced by 70% in our experiments when the inscribed radius of foils is reduced from 870 μm to 87 μm, which is much shorter than the laser pulse length ($\sim$ 200 μm). PIC simulations indicate that the number reduction is caused by a higher sheath potential in a small foil case. In that case, the sheath potential grows quickly and is high for a long period because the field spreading is restricted within the foil area.

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