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Pulsed Nd:YAG Laser heating of Multi-walled carbon nanotubes film RYOSUKE KOZAI, TOSHIYUKI NAKAMIYA, YOICHIRO IWASAKI, YOSHITO SONODA, Tokai University, FUMIAKI MITSUGI, KEISUKE SEMBA, TOMOAKI IKEGAMI, Kumamoto University, SHIN-ICHI AOQUI, IKUYA MURAMOTO, Sojo University — Multi-walled carbon nanotubes (MWCNTs) film surface is flashed with the second harmonic (λ=532 nm) of a single pulse of Nd:YAG laser. The dynamics of pulsed nanosecond laser heating process is simulated by the solution of the one-dimensional heat flow equation. When MWCNTs film is irradiated with a pulsed Nd:YAG laser of 23.7 mJ/cm^2, the calculated value of maximum surface temperature becomes 304°C. The surface temperature increases from 595°C to 2968°C with the increase of laser power from 59.4 mJ/cm^2 to 469 mJ/cm^2. MWCNTs film is examined by the intensity of the two characteristic Raman shifts I_D (defect-induced mode: D-band) and I_G (graphite-induced mode: G-band) to clarify the effect of pulsed Nd:YAG laser heating. Moreover, we propose an automatic measurement algorithm of the diameters of MWCNTs using Scanning Electron Microscopy (SEM) images. This method is useful to discriminate the diameter of as-grown CNTs and after annealing with a pulsed Nd:YAG laser.

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