

Light amplification by stimulated emission of radiation (Laser) is an advanced process used in several engineering applications for surface hardening. The effect of different Nd-YAG (Neodymium Yttrium) laser parameters such as laser energy, pulse duration on the microstructure, wear and microhardness of surface gray cast iron were investigated. These range of these parameters are pulse duration (0.8, 1.3 and 2ms) and laser energies (1.84, 2.31 and 4.12 J) at fix wavelength (1064nm). The results have shown that the microstructure of gray cast iron was affected by the laser energy, where increasing laser energy led to increase in the area of melted zone and heat affected zone, which resulted the formation of martensite and irregular graphite. It was also shown that the highest microhardness value was (1025 HV) at the spot diameter (0.64 mm) with energy (4.12 J) and pulse duration (0.8ms). The loss of weight and the wear rate of the sample after laser treatment was decreased by about (78%) with pulse duration (0.8ms) and the surface roughness decreased by about (27%) after laser treatment with pulse duration (0.8ms)