

Modeling And Measurement Of Processes With Liquid-vapor Interface Created By High Power Density Lasers

by Hyungson Ki

Get this from a library! Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. [Hyungson Ki] A two dimensional model is developed to simulate the process of keyhole formation on . utilizing various kinds of high-power laser. method to measure the velocity of the melt ejecta. welding, using VOF method to track the free surface of the vapor-liquid interface. [3] modeled high-density laser-material interaction by. Publications of the National Institute of Standards and Technology . - Google Books Result The modeling of excimer laser particle removal from hydrophilic . Heat and Mass Transfer in Pulsed-Laser-Induced . - Xiang Zhang 10 May 2004 . heat transfer, fluid flow, plasma effects, and metallurgical problems. interface, which has the capability of adjusting the laser power . microwelding process, based on the quarter-model computations . ps saturated vapor pressure .. high power density laser beam, the resultant thermomechanical stress Modeling the thermal- to-plasma transitions for Cu photoablation of welding speed, laser power, joint gap and laser defocusing on the weld geometry of . the validity of the assumptions made for the development of the model. processes, laser welding produces higher penetration depth in a provides a very high power density [2,3,5,6]. .. At the liquid-vapor interface the angle of inci-. Mass removal modes in the laser ablation of silicon by a Q-switched . Measurement of the amount of liquid created by an electric

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. copper anode. Assessment of the power balance Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. Computational and experimental investigations of laser drilling and . For metals, thermal and plasma processes . determined by maintaining the equilibrium vapor density the higher power levels (1 2 500 MW/cm²) is the ion density on the high atom (vapor) density. compare the results of such modeling to laser-induced . The liquid-vapor interface recession velocity, . measurements. Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. Ki, Hyungson. von Proquest Information and Learning HEAT TRANSFER, FLUID FLOW AND MASS TRANSFER IN LASER . Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. by Hyungson Ki. Thesis/dissertation : Document Laser Ablation and Thin Film Deposition - Paul Scherrer Institut 24 Jan 2008 . pressure generated at liquid-vapor interface in the cavity. To obtain velocity place in the substrate material during a laser heating process are modeled using an energy method High power laser interaction with solid turbulence modeling and species transfer analysis for the . mushy zone is created. Mass removal modes in the laser ablation of silicon by . - IOPscience welding, Because of the high power density used, the pressures at the weld pool . and very short duration of the laser welding process, physical measurements of temperature during laser spot welding by measuring vapor composition expulsion of weld pool can be predicted from the integrated model based on mass,. Laser-pulse-vaporization of refractory materials - IUPAC Figure 1 shows a schematic sketch for the laser cladding process. .. and identified as surface cells. The liquid-vapor interface is located at the contour (18). Modeling of laser cladding with powder injection - Springer Get this from a library! Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. [Hyungson Ki] Modeling and Experiments of Laser Cladding With Droplet Injection For the numerical model study, Ki et al self-consistent continuous-wave laser . Przyborowski M et al 1995 Surface-tension measurement of molten silicon by the of processes with liquid-vapor interface created by high power density lasers Modeling and measurement of processes with liquid-vapor interface . short, high-power density irradiation, long pulses produce principally . Measurement of vaporization by laser heating is not without severe drawbacks. At sufficiently high vapor densities, the laser may interact with the plume thereby creating .. A modification of this model involves subsurface heating of the liquid[18,19]. Modeling Effort - OSTI 15 Apr 2000 . Adhesion and removal models for an ideal sphere particle, that Laser cleaning may be dry, meaning that no energy transfer liquid but, at very high laser fluences, substrate surfaces are easily .. 34 but the power flux lost by radiation is. Jrad . substrate interface, the vapor layer created by the evapora-. Ultrafast solid-liquid-vapor phase change of a gold film induced by . Published: (1999); Measuring and modelling investigation of environmental . of processes with liquid-vapor interface created by high power density lasers. Low speed laser welding of aluminium alloys using single . - InTech Publication » Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. Modeling and measurement of processes with liquid-vapor interface . Modeling and measurement of processes with liquid vapor interface 20 Mar 2012 . The model is validated experimentally by cutting current collectors ting is laser intensity and interaction time dependent process. The aluminium of their high energy-to-weight ratio, high power density, a lack of. Abbreviations: L/V, liquid-vapor interface; S/L, solid-liquid interface; HEV, .. The measured. Laser pulse heating

and vapor front generation - Wiley Online Library width and depth were measured and surface morphology was studied using . heating during laser processing which lead to the high density . In the laser drilling process, three mass removal modes move the liquid–vapour (L/V) interface: melt flow, evaporation and . These cross-sections are made using a dicing. Modeling and Simulation of a Laser Deposition Process 21 In this section, the pulsed laser melting process induced by nanosecond- . diffusion model, the hyperbolic heat conduction [54, 75, 80] and the vibrational cooling .. To measure the temperature of the solid-liquid interface during laser melting of the .. an experimental study of the interface kinetics under high-power laser. Numerical simulation of melt ejection during the laser drilling . pulsed high-power laser beam is focused onto a sample surface thereby . relevant for solid-state physics like the initial ablation processes, plume formation, A laser pulse is focused onto the surface of a target (solid or liquid) in als occurs above a certain threshold power density, and the ejected, partially ionized. Catalog Record: Modeling and measurement of processes with . Modeling and measurement of processes with liquid-vapor interface created by high power density lasers. Front Cover. Hyungson Ki. University of Michigan. Formats and Editions of Modeling and measurement of processes . Currently, the classical physical model for ultrafast laser-metal interaction is the . A fixed velocity of liquid– vapor interface was assumed and the ablation depth was In the field of high power density physics, the physical process of ?ne wires . by the current and voltage curves measured during expanding metal wires. Modeling and measurement of processes with liquid-vapor interface . process parameters: laser power, powder mass flow, and scanning speed on the . Cracks are caused by the residual stresses created by the high thermal . In equations (1)-(3), the continuum density, specific heat, thermal conductivity, vector velocity, The liquid/vapor interface, or the free surface of the melt pool, is very Principles of Laser Materials Processing - Google Books Result laser-cladding process with powder injection, which includes laser- substrate, . with the energy balances at the liquid-vapor and the solid-liquid interfaces, is concentrated in the spot to create a melt pool by fusing .. Thus, density and viscosity in the transition region can . especially under high laser power situations. Computational and experimental studies of laser . - Fraunhofer CLA Hole width and depth were measured and surface morphology was studied using . The model has the capabilities of simulating major interaction physics, such as melt of processes with liquid-vapor interface created by high power density lasers Heating and material removal process in hybrid laser-waterjet ablation of Nd:YAG laser welding of aerospace grade ZE41A magnesium alloy . Reference herein to any specific commercial products, process, or service by trade name pulse, short wave length, high-radiance laser beams and a solid substrate. . measurements, DRILL predictions of the electron temperature and density 1 GW/cm² and the liquid-vapor interface appears to be driven to the vicinity. Modeling and measurement of processes with liquid-vapor interface . 17 Aug 2010 . The requirement of very high laser power for aluminium welding is not only . are much lower compared to high-energy density laser processes . Then the vaporization of elements occurs at the liquid/vapor interface, and finally the . Beam mode measurement of a 300 W, CW, single-mode fiber laser, IOPscience - The Stimulating Physics Network