The Open Access Journal of Science and Technology

Abstract

Direct Ceramic Additive Manufacturing by Ultraviolet Laser Lithography

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Abstract:
Dielectric clay segments with miniature cross sections were effectively created by recently evolved bright laser lithography. As an added substance producing, 2D cross areas were made through dewaxing and sintering by UV laser drawing on spread pitch glue including fired nanoparticles, and 3D composite models were sterically printed by layer covers. As the column material of the lithography, earthenware nanoparticles from 500 nm in normal measurements were scattered in to photograph delicate fluid gums from 50 % in volume portion. The tar glue was spread on a glass substrate at 50 μm in layer thickness by a precisely moved blade edge. A bright laser light emission nm in frequency was balanced at 10 μm in spot width and checked on the glued tar surface. Illumination power was changed from 600 to 700 mW for enough cementing profundity for 2D layer holding. Table 1 shows the cycle conditions. Checking speed was changed from 50 to 100 mm/s to make fine grid structures as appeared in Figs. 1 (a), (b) and (c). The half frequency of the episode bright beam ought to be similar with the nanoparticles holes in the pitch glue, consequently the dewaxing and sintering will be acknowledged through the electromagnetic waves reverberations and confinements as appeared in Fig. 1 (c). Through the layer cover, the 3D titania structures with 97% in volume part were effectively created. The titania precious stone structure was dissected as double period of anatase and rutile. After the warming treatment at 1350 °C for 2 hs, titania parts with rutile stage was acquired. The straight shrinkage through the sintering was < 1 %. The dielectric consistent and misfortune were estimated as 100 and 0.3 at 0.02 THz in an electromagnetic wave recurrence, separately. The precious stone cross section with four coordination number of 270 μm in periodicity could diffract electromagnetic floods of 0.25 to 0.45 THz, and show prohibited holes in transmission spectra for every spatial bearing. The dielectric cross section particularly call photonic gem.

Biography:
Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation "Materials Tectonics" for environmental improvements of "Geotechnology", multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company "SK-Fine" was established through academic-industrial collaboration.

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Webinar On Materials Engineering, September 15, 2020, Osaka, Japan

Citation: Soshu Kirihara, Direct Ceramic Additive Manufacturing by Ultraviolet Laser Lithography, September, 15, 2020, Osaka, Japan