

RAPID DENSIFICATION OF TECHNICAL CERAMIC COATINGS USING A PRECISE CONTROLLED CONTACTLESS FLASH SINTERING SYSTEM

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Lucideon has developed a contactless flash sintering (CFS) system for sintering technical ceramic coatings. The system combines a unique three-electrode setup, a three-axis robot, and a control interface to enable the contactless flash sintering on the selected area on a thin ceramic coating. An in-house designed software is integrated into the control interface allowing precise control of the electrical parameters and motion of the electrodes of the system during the sintering process. Single-track sintering experiments on tape-cast 8% yttria-stabilized zirconia (YSZ) thin ceramic coatings with different processing conditions parameters (*i.e.*, x-y electrode velocity, number of sintering passes, current, voltage, and sample thickness) were performed in this study. The cross-section of the sintered track was analyzed using scanning electron microscopy (SEM) for correlations between heating profile, porosity, and grain size as a function of processing parameters. The results from the single-track sintering experiments not only demonstrate the functionality of the CFS system, but also allow identification of the fundamental limitations of CFS as a function of kinetic parameters. The outcome from this study will guide the development of CFS technology towards scale-up, sintering complex geometries and/or bulk sintering in the technical ceramics.

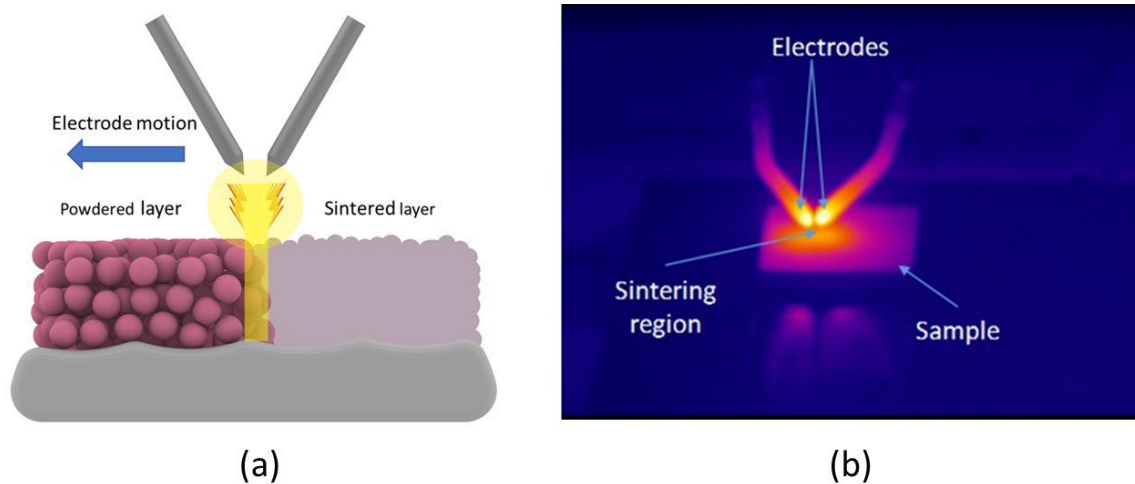


Figure 1. (a) A schematic illustration and (b) a snapshot of the three-electrode setup on the Lucideon's contactless flash sintering (CFS) system