A NOVEL SYSTEM FOR QUENCHING DURING FLASH SINTERING

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The study of the ruling mass transfer mechanisms in Flash Sintering (FS) has gotten a lot of attention in recent years. Some mechanisms have been suggested, e.g. nucleation due to movement of charged defects, Joule heating runaway and chemical reaction propagation[1]. In order to further study the phenomena which occur during the different FS stages and shed light on the ruling mass transfer mechanisms, a novel simple system was developed. In this system (Figure 1), FS is done on a ceramic green body in a vertical tubular furnace using vacuum to hold the sample inside the furnace. This configuration enables dropping the sample into a glass of distilled water (or other suitable coolant) at any time, thus quenching the sample and "freezing" the microstructure of the material under FS conditions. The quenched sample can be taken to further investigation of the microstructure, such as SEM analysis. The system design and initial results of FS and quenching of gadolinium-cerium oxide samples will be presented.

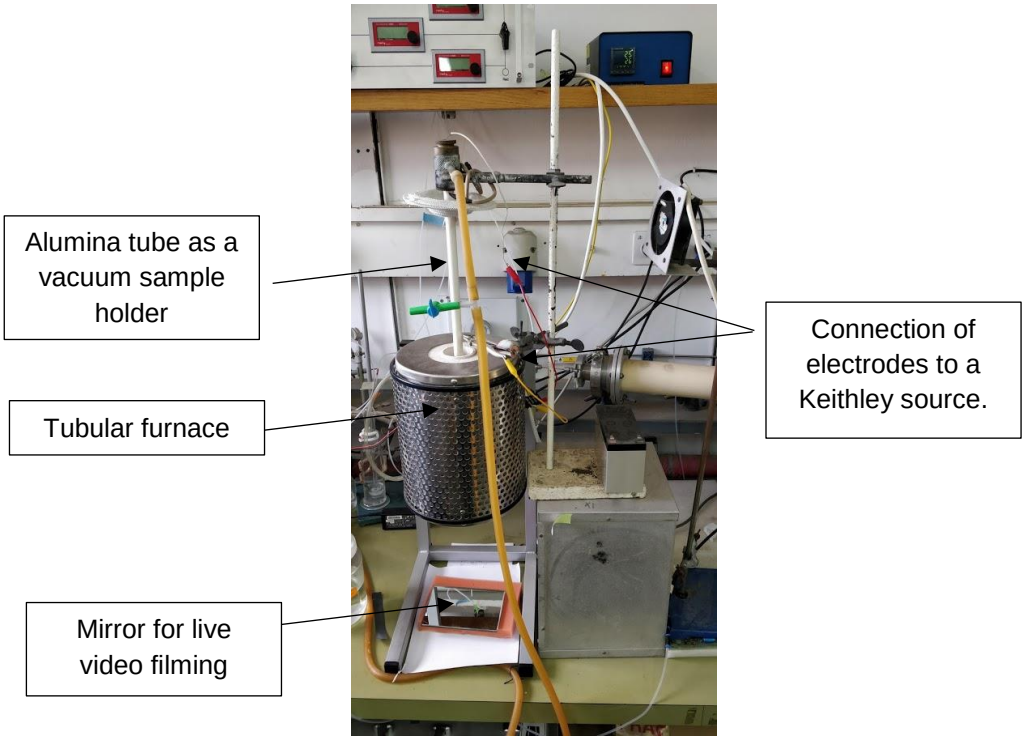

Figure 1 – The flash and quenching system

[1] M. Becker, N. Shomrat, Y. Tsur, Adv. Mater. 2018, 30, 1706369.