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Experimental Investigation of Combustion in Porous Media Burners with Tailored Matrix-Structure Using Additive Manufacturing PRIYANKA MUHUNTHAN, SADAF SOBHANI, EMERIC BOIGNE, DANYAL MOHADDES, MATTHIAS IHME, Stanford University — Porous Media Burners (PMBs) have been shown to enable enhanced burning velocities, extend flammability limits, and lower emissions. In this study, the viability of 3D printing complex ceramic structures is examined, and the performance of a novel functionally graded PMB design is investigated. Three different alumina matrix foams were designed and printed using lithography-based ceramic manufacturing. The flame stability, temperature profiles, and pressure drop for each burner are examined. X-ray computed tomography is used to characterize the printed matrix structure and to obtain important geometric information about pore diameter and porosity profiles. This work builds upon previous experimental investigations into graded PMBs, and the results demonstrate the feasibility of using additive manufacturing for tailoring PMB topologies to achieve specific system requirements.

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