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Self-similar flow channel designs for parallel multiscale transport of multiple fluid species[1] KENNETH LEE, OMER SAVAS, University of California, Berkeley — The need for multiscale fluid transport arises in a number of engineering applications involving fluid delivery or collection over a range of different lengthscales. A "tree-shaped" system of flow channels has been an efficient transport solution commonly practiced by biomimetics. There has been much work in optimizing these dendritic flow systems, primarily for cooling applications. However, most designs can be costly to manufacture and limited in scalability. Moreover, most systems are restricted to the transport of a single fluid species. This work explores the feasibility of self-similar flow channel designs to provide parallel multiscale transport of multiple fluid species. The self-similar characteristic of these designs simplifies manufacturing and allows for flexible scalability. Prototypes for the parallel transport of one and two independent fluid species are supported with analytical theory and experimental work. Designs for three and four species are presented as well.

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