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Multistream Laminar Flow: From a challenge in mixing to membraneless fuel cells and microreactors for cofactor regeneration. PAUL KENIS, UIUC — Over the last decade a wide variety of research efforts in microchemical systems, in which fluid flow is laminar, has developed. The original challenge of mixing in the absence of turbulence in this laminar flow regime has been overcome through various technical approaches including zig-zag or serpentine-shaped channels (Branebjerg, Beebe *et al.*), lamination (e.g. Manz, Jensen *et al.*), hydrodynamic focusing (Austin *et al.*), and integrated herringbone features (Stroock *et al.*). Others have grasped the opportunity to utilize multistream laminar flow for example for a T-sensor for blood analysis (Weigl *et al.*) and in microfabrication or cell studies (Whitesides *et al.*). This presentation will highlight the development of (i) a membraneless fuel cell, and (ii) a microreactor for cofactor regeneration that utilize multistream laminar flow. Various performance-determining characteristics and engineering improvements will be discussed.

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