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### **Mixing in small scale flows**

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Mixing is often a crucial step in many microfluidic devices but yet is difficult to achieve due to the low Reynolds numbers typical of such flows. While many approaches have focused on passive mixers based on complex geometries, our group has concentrated on active mixing solutions applicable to micro-channels of simple geometries. In particular, we will describe the enhancement of mixing between two miscible fluids flowing down a channel based on the interfacial instability between the fluids when the latter have different electric properties and are subjected to an electric field perpendicular to their interface. Recent microfluidic developments, however, require that the fluids be transported as drops and that reactions occur within the drops. It is then shown how electric fields can be used not only to generate monodisperse drops in straight microchannels but also to increase mixing within the drops.