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Analysis of angle effect on particle flocculation in branch flow KARTHIK PRASAD, KATHRYN FINK, DORIAN LIEPMANN, Univ of California - Berkeley — Hollow point microneedle drug delivery systems are known to be highly susceptible to blockage, owing to their very small structures. This problem has been especially noted when delivering suspended particle solutions, such as vaccines. Attempts to reduce particle flocculation in such devices through surface treatments of the particles have been largely unsuccessful. Furthermore, the particle clog only forms at the mouths of the microneedle structures, leaving the downstream walls clear. This implies that the sudden change in length scales alter the hydrodynamic interactions, creating the conditions for particle flocculation. However, while it is known that particle flocculation occurs, the physics behind the event are obscure. We utilize micro-PIV to observe how the occurrence and formation of particle flocculation changes in relation to the angle encountered by particle laden flow into microfluidic branch structures. The results offer the ability to optimize particle flocculation in MEMS devices, increasing device efficacy and longevity.

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