



Showcasing research from Professor Juan G. Santiago's laboratory, Department of Mechanical Engineering, School of Engineering, Stanford University, CA, USA.

A three-dimensional microfluidic device embedded within a thermal cycler tube for electrokinetic DNA extraction

We demonstrate a three-dimensional microfluidic structure embedded directly into a standard PCR tube, enabling seamless integration with commercial thermal cyclers. This compact system supports isotachophoresis (ITP)-based nucleic acid purification, PCR amplification, and real-time fluorescence detection in a single, closed device. We validated its performance by extracting and detecting SARS-CoV-2 N gene targets from raw human serum using FAM-labeled TaqMan probes. The device achieves a sensitivity of 100 cp/μL within 60 minutes and highlights a scalable approach to integrate advanced microfluidics with established molecular diagnostic platforms.

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As featured in:



See Juan G. Santiago *et al.*,
Lab Chip, 2025, **25**, 3962.