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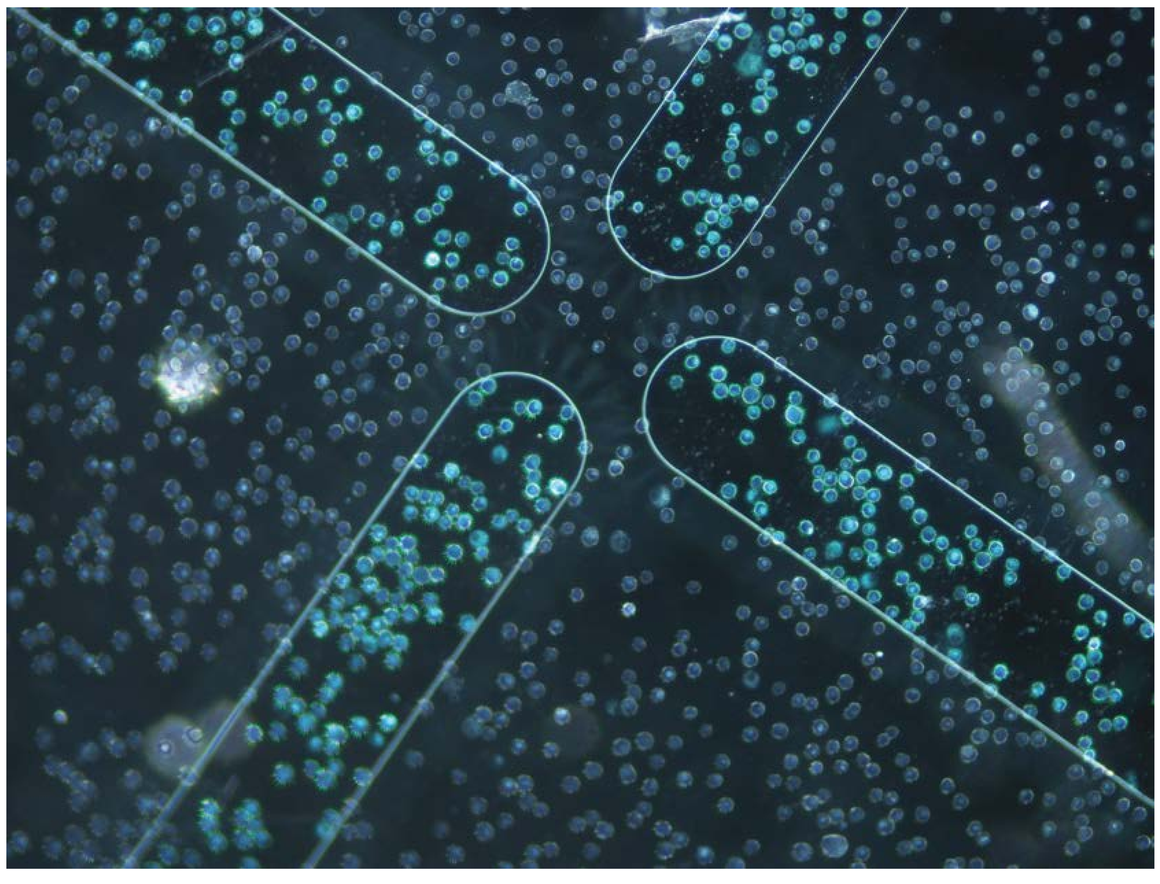
LABEL-FREE NANOSCALE ELECTROROTATION PLATFORM FOR EXTRACELLULAR VESICLE CHARACTERISATION



INL has developed a label-free electrorotation platform for the characterisation of nanoscale particles such as extracellular vesicles (EVs) in liquid samples. The technology combines an optically transparent electrorotation chip with optical scattering or interferometric detection to enable high-resolution analysis of particles in the 10–1000 nm range.

The system applies phase-shifted alternating electric fields to induce controlled rotation of EVs based on their dielectric and structural properties. The resulting optical signal fluctuations are analysed using Fourier-based methods to separate rotational motion from Brownian effects, enabling extraction of structural information such as membrane composition and lamellarity. The platform operates without fluorescent labels or surface functionalisation and is compatible with biological fluids including blood, plasma, and serum.

+ Suggested applications

Nanoparticle and vesicle characterisation in biological fluids
Development of next-generation liquid biopsy platforms

+ Patent Status

An offer for collaboration and patent licensing

+ Key benefits

Label-free operation: no antibodies, fluorescent markers, or surface functionalisation required
Structural sensitivity: detects EV morphology and membrane structure, including lamellarity
Nanoscale capability: characterisation of particles in the 10–1000 nm range
High-throughput analysis: simultaneous measurement of multiple nanoparticles
Low sample requirements: minimal volume and low-cost operation
Clinical potential: suitable for integration into laboratory and point-of-care diagnostic systems

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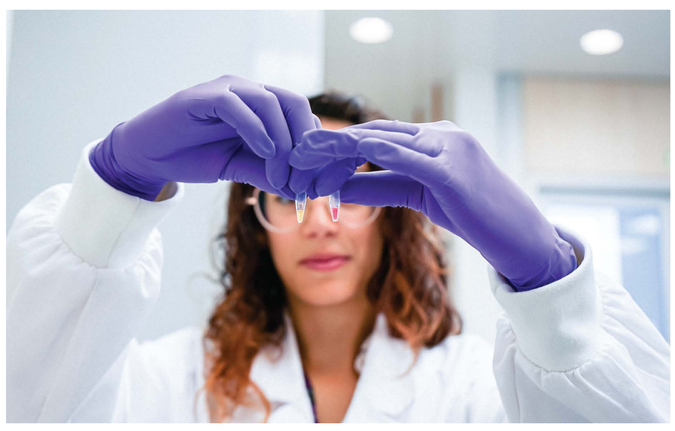

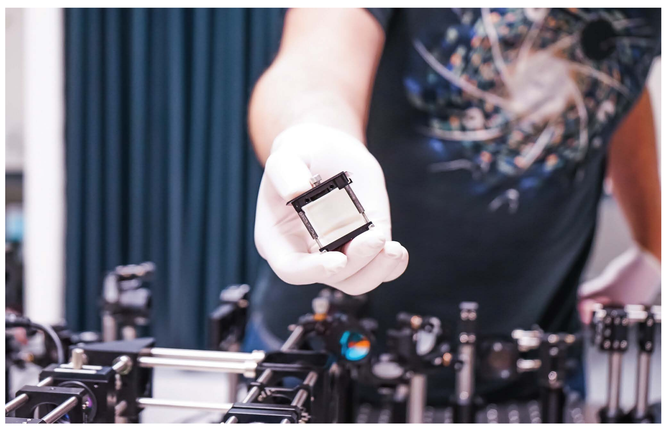

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