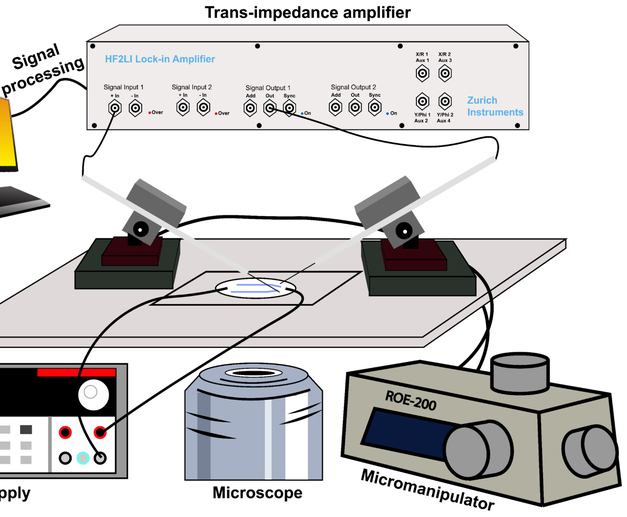
kers for early diagnosis and therapeutics in liquid biopsy. nal proteomic profiling and genomic characterization methods structure of the exosomes by labelling and lysing steps.

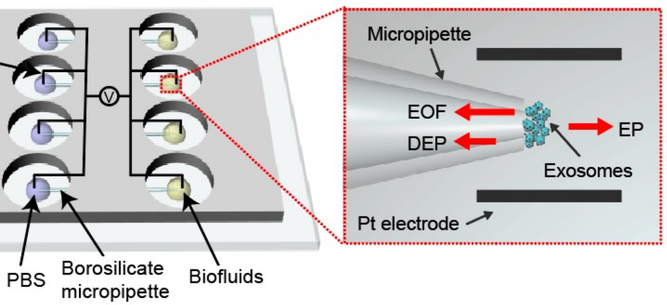
novel **insulator-based dielectrophoretic (iDEP) device** to rapidly m biofluids, followed by the electrical impedance measurements aracterize exosomes based on their unique **dielectric properties**.

MATIC OF DETECTION PLATFORM

natic illustration of the impedance measurement system



The schematic illustration of the iDEP device



$$F_{DEP} = 2\pi r^3 \varepsilon_m Re(f_{CM}) \nabla E^2$$

ophoretic force, r is the radius of the exosomes, $Re(f_{CM})$ is the real ssotti factor, and defined as:

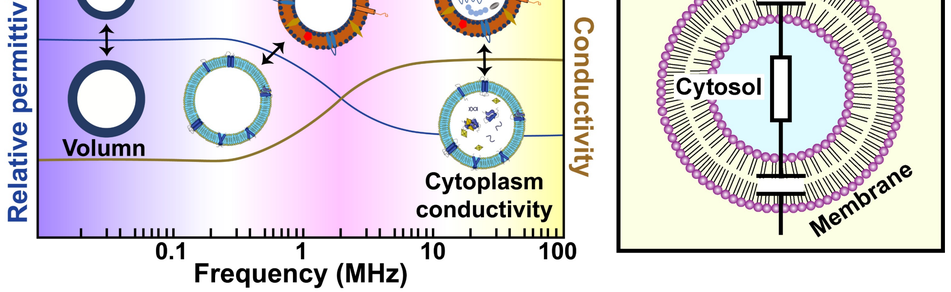
$$Re(f_{CM}) = (\sigma_p - \sigma_m)/(\sigma_p + 2\sigma_m)$$

e the conductivities of particle and suspending medium.

$$F_{EP} = 6\pi\eta r \mu_{EP} E$$

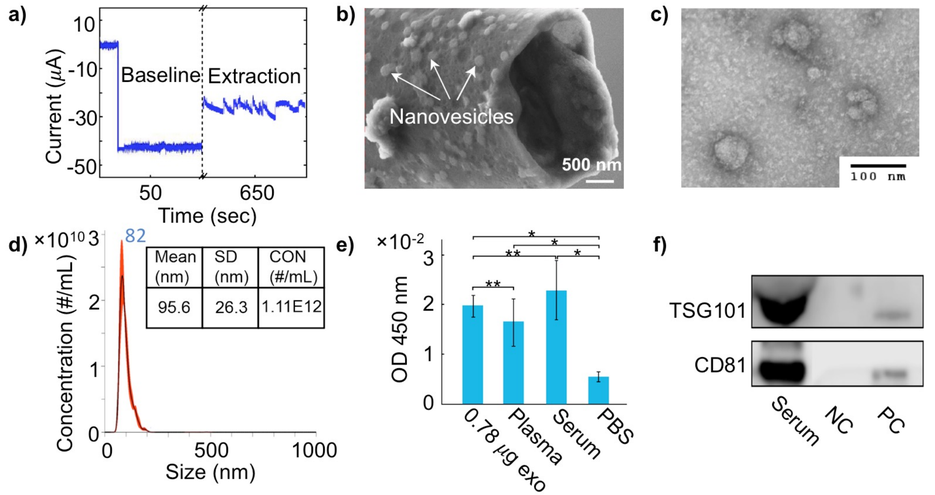
oretic force, η is the solution viscosity, E is the applied electric electrophoretic mobility and presented as:

$$\mu_{EP} = (2\zeta_p \varepsilon_m)/(3\eta)$$



RESULTS

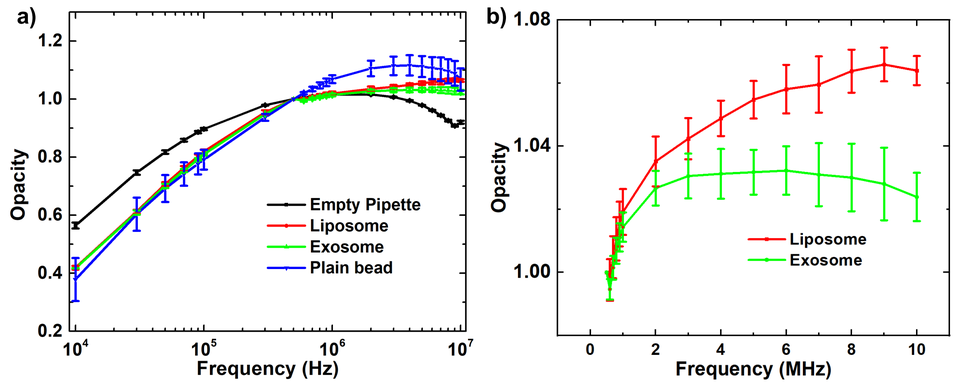
Exosomes entrapment and characterization



- The characterization and quantification vesicles verified that exosomes were successfully isolated from biofluids and E-field had minimal impact on exosome morphology and integrity.

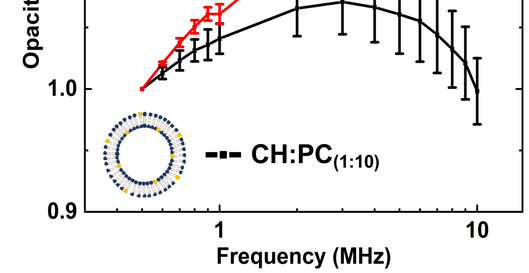
Comparison of particles with different dielectric properties

- Polystyrene beads (-27.99 mV) , liposomes (-12.68 mV) and exosomes (-12.69 mV).



- Impedance result was presented as opacity: defined to normalize the number of particles entrapped at different experiments.

$$O(f) = \frac{Z(f)}$$



- The membrane capacitance: $CH:PC_{(1:10)} = 3.14\times10^{-17}$ F ; $CH:PC_{(10:1)}$
- Higher opacity magnitude was observed in the liposomes with capacitance $CH:PC_{(10:1)}$
- Equivalent circuit developed by Foster and Schwan: *amplitude capacitance of the membrane*

$$Z = R_{in} * \left(\frac{V_{in}}{V_{amp}} - 1\right) - R_{out} \qquad Z = \frac{1}{jwC_{mem}}$$

Characterization of exosomes from different orig

- The opacity of exosomes cultured in PA was lower than PA+GW
- Exosomes from PA-treated hepatocytes displayed increased n resulting in lower membrane capacitance.
- GW4869 as inhibitor inhabited the biosynthesis and reduced the

CONCLUSIONS

- An innovative electrical impedance measurement system was invasively trap and characterize exosomes from different origin
- The characterization and quantification of vesicles verified th successfully isolated from biofluids and E-field had minimal i morphology and integrity.
- Liposomes with known dielectric properties as model system feasibility of differentiating membrane capacitance at the MHz f
- Distinguishable opacity of exosomes under different cultu observed to represent the difference between membrane co biogenesis was subjected to systematic change.

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