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Non-contact Mechanical Characterization of Extracellular Vesicles with Raman Spectra Interpretations[1] JOANNA DAHL, University of Massachusetts Boston — Cells exchange information by secreting micro and nano-sized extracellular vesicles (EVs) ranging in size from 30nm to 5um. While it was once thought these cell-derived membranous vesicles were simply cell debris, recent efforts have determined that EVs have profound biological significance and therefore potential for clinical therapies and disease diagnostics. There is still much to understand about fundamental EV biological, physical, and chemical properties before clinical applications can be developed. The mechanical behavior of EVs—the physical implications of the lipid, protein, and nucleic acid constituents and their arrangements, all of which are linked to EV biological signature, cell of origin, and mode of biogenesis—has hardly been explored. To date, EV mechanical properties have been measured with atomic force microscopy with its problematic adhesion and hard substrate effects for small, soft EVs. We present mechanical property measurements of single microscale EVs derived from human blood plasma using a non-contact microfluidic technique. Raman spectra are used to interpret the mechanical property measurements through analysis of protein amide and phospholipid absorption bands that quantify protein and lipid composition and structures.

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