Characterization and Optimization of Interferometric Reflectance Imaging Sensing for Label-free Detection of Single Ebola Virions

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***Abstract*-Interferometric reflectance imaging sensing (IRIS) has advanced rapidly to become one of the premier rapid label-free single nanoparticle detection methods. However, data generated varies greatly based on the components and construction of a given system. Automated nanoparticle detection algorithms depend on assumptions about the imaging setup and may fail if these assumptions are not met. For instance, structures below the scale of the point spread function (PSF) are treated as spheres and evaluated as 2D Gaussian distributions in IRIS images. If the PSF is made too fine, oblong structures such as ebola virus will not appear as a Gaussian distribution and will cause the algorithm to fail. Here I designed, manufactured, and tested artificial ebola virions (phantoms) to safely and reproducibly evaluate the performance of different IRIS biosensor setups, detection algorithms, and how phantom dimensions affect sensor data.**