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A Comparative Study of X-ray Photoelectron Spectroscopy, X-ray Fluorescence, and Ion Beam Analysis on Homogeneous Thin Solid Films of L-sized Blood Droplets solidified via Hyper-Hydrophilic Coatings (HemaDropTM) NIKHIL SURESH, SHAURYA KHANNA, AMBER CHOW, Arizona State University, SAAKETH NARAYAN, University of Pennsylvania, SUKESH RAM, Yale University, MOHAMMED SAHAL, NICOLE HERBOTS, AASHI GURIJALA, Arizona State University, MICRODROP DIAGNOSTICS, LLC TEAM, SIO2 INNOVATES, LLC TEAM, ARIZONA STATE UNIVERSITY TEAM — Blood diagnostics require ~7 mL of blood per test and takes days. Frequent drawing of blood induces hospital-acquired anemia in premature infants and ill patients. Decreasing volume needed and improving analysis speed and accuracy can enhance healthcare. HemaDropTM, a hyper-hydrophilic coating, can solidify L-sized blood droplets in minutes into Homogeneous Thin Solid Films (HTSFs) without phase separation. Blood HTSFs were tested for accuracy of electrolytes (Na, K, Mg, Ca, Cl) and heavy metals (Fe) measurements from μL drops. Quantitative blood electrolyte compositions via SIMNRA simulations on successive IBA spectra on HTSFs are compared to measurements via XPS and XRF. Relative error analysis between different HTSFs and damage curve analysis of repeated measurements on the same HTSF establish reproducibility to <10%. Comparison of compositional measurements of blood and balanced saline solution (BSS) with known concentration of BSS aims to allow direct conversion of atomic % to concentration in mg/dL, the main metric in blood diagnostics.

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