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THz Dielectric Characterization of High Loss liquids using Total Internal Reflection Time Domain Spectroscopy DEEPU GEORGE, Dept of Physics, SUNY Buffalo, GAYATRI VENUGOPAL, RAJAGOPAL PANCHAPAKESHAN, NATALIA LITCHINITSER, Dept of Electrical Engineering, SUNY Buffalo, ANDREA MARKELZ, Dept of Physics, SUNY Buffalo — We introduce a technique to remotely determine the salt content of high concentration salt solutions using terahertz time domain spectroscopy. Terahertz is highly sensitive to water content, however the absorption strength is so high, characterization of aqueous solutions with transmission spectroscopy is not feasible with standard sources. Previously investigators have overcome this limitation using terahertz total internal reflection time domain spectroscopy to characterize alcohol and sugar content in solutions {P. Uhd Jepsen et al, Optics Express, Vol 15 No22 (2007)}. However the optical system used mixed the incident polarization content at the interface, increasing the complexity of the analysis. Our method again uses total internal reflection at a silicon-aqueous sample interface, but the optics ensure the polarization of the THz beam remains the same throughout simplifying the analysis. We have applied the technique for measuring the dielectric constants of high concentration salt solutions such as KI and NaI in the range 0.2 to 1.5 THz. The dielectric strength of these solutions is modified with increasing salt concentration and can be significantly higher than pure water.

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