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**A photopyroelectric sensor for the high-resolution thermophysical characterization of liquid mixtures.** ANNA MATVIENKO, ANDREAS MANDELIS, Center for Advanced Diffusion-Wave Technologies, University of Toronto — A common principle of photothermal techniques is the study of thermal wave propagation in a sample following heating by an intensity modulated laser beam. In this study, we applied the photopyroelectric thermal-wave cavity technique with the common-mode-rejection demodulation scheme to the measurements of thermal diffusivity of water-alcohol mixtures at low concentrations. The high sensitivity of the photothermal signal to the thermal diffusivity of samples relies on the exponential decay character of the thermal-wave field at a given modulation frequency. The common-mode-rejection demodulation scheme involves the launching of two unequal duration pulses over one modulation period. In this case, the lock-in amplifier output represents the difference between the response waves produced by each one of two pulses. This differential technique shows resolution at the level of 0.2% v/v of alcohol in water, the highest ever reported using thermophysical techniques. In terms of future applications the proposed system can eventually be implemented into a self-contained in-situ liquid pollution monitor.

Anna Matvienko
Center for Advanced Diffusion-Wave Technologies, University of Toronto

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