Abstract Submitted
for the SES17 Meeting of
The American Physical Society

Sorption of Potential Toxicants by PDMS in Microfluidic Devices ALEXANDER AUNER, KAZI TASNEEM, LISA MCCAWLEY, DMITRY MARKOV, SHANE HUTSON, Vanderbilt Univ, EPA VPROMPT TEAM — The need for deeper understanding of how organoids can interact in toxicant assessment applications has advanced the design of interconnected polydimethylsiloxane (PDMS) organ-on-chip devices. Microfluidic devices adsorb chemicals through exposed PDMS surfaces creating problematic changes in dose response curves and timing of delivery. Recent efforts have attempted to quantify what molecular agents used in microfluidic devices will be adsorbed by PDMS. Of sixteen potentially toxic chemicals used in our applications, we identified five which adsorbed to PDMS using both visible light and infrared absorption spectroscopy. Spectrometer peak calibration from our chemicals allowed us to establish quantitative relationships for chemical absorption and extract time dependent adsorption coefficients, saturation amount and forward and reverse rate constants. The relationship between adsorption and select molecular properties was investigated, and we have shown the octanol-water partition coefficient (Log P) to be a decent predictor of absorption for chemicals with Log P >2.7. Experimental rate constants were used to model adsorption due to continuous and bolus exposure of several toxicants in a device. From this analysis, we determined that timing is critical for delivery of chemicals that reversibly bind to PDMS in order for cells to not be over- or under-dosed by a few orders of magnitude.

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Date submitted: 11 Oct 2017 Electronic form version 1.4