Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Temperature Control in a Franz Diffusion Cell Skin Sonoporation Setup JEREMY ROBERTSON, SID BECKER, University of Canterbury — In vitro experimental studies that investigate ultrasound enhanced transdermal drug delivery employ Franz diffusion cells. Because of absorption, the temperature of the coupling fluid often increases drastically during the ultrasound application. The current methodologies for controlling the coupling fluid temperature require either replacement of the coupling fluid during the experiment or the application of a time consuming duty cycle. This paper introduces a novel method for temperature control that allows for a wide variety of coupling fluid temperatures to be maintained. This method employs a peristaltic pump to circulate the coupling fluid through a thermoelectric cooling device. This temperature control method allowed for an investigation into the role of coupling fluid temperature on the inertial cavitation that impacts the skin aperture (inertial cavitation is thought to be the main cause of ultrasound induced skin permeability increase). Both foil pitting and passive cavitation detection experiments indicated that effective inertial cavitation activity decreases with increasing coupling fluid temperature. This finding suggests that greater skin permeability enhancement can be achieved if a lower coupling fluid temperature is maintained during skin insonation.

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Date submitted: 24 Jul 2017 Electronic form version 1.4