Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Streaming flows and propulsion by vertically oscillating free surfaces[1] JUNQI YUAN, SUNG KWON CHO, University of Pittsburgh, UNIVERSITY OF PITTSBURGH TEAM — Vertical oscillations of the free surface generated by AC electrowetting can be used to propel mini-scale floating objects. In this presentation, detailed mechanisms in propulsion are discussed. Flow visualization shows that the vertical oscillations of free surface generate a quasi-steady streaming flow. The overall flow pattern is that the fluid is tangentially drawn from the sides of the electrode and is ejected normal to the electrode. It seems that this streaming flow is responsible for pushing the electrode in an opposite direction to the normal flow. Additionally, the effects of amplitude and frequency of vertical oscillation on the streaming flow pattern and propulsion efficiency are also presented. Finally, it is discussed that the depth of free surface is another key parameter that affects propulsion strength.

[1]This work is in part supported by the National Science Foundation

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Date submitted: 04 Aug 2011 Electronic form version 1.4