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Thermal effects of laser illumination on coated quartz crystal microbalance surfaces[1] BENJAMIN KELLER, KEELEY STEVENS, LIMING PAN, JACQUELINE KRIM, North Carolina State University — Prior work on the thermal sensitivity of quartz crystal microbalances (QCM) has shown them to be powerful tools, capable of measuring milli-Kelvin temperature impulses while also presenting a well-understood response to steady state heating [1]. This has been demonstrated for physical contact to the QCM surface via a STM tip with a temperature differential [2]; here we present a novel application wherein a laser is focused onto the coated QCM, thus applying a non-contact thermal pulse. By applying variable length (second to minute) exposures from a laser source we can isolate the thermal shock, time decay and gross heating effects. The system is sensitive to the coating used, showing significant differences in heating for absorbative and reflective coatings. This method is unique in that the QCM measures energy lost into the substrate, unlike standard techniques which focus primarily on material efficiency. This has potential to characterize various coatings used in solar cells and thermal collectors, as well as in photovoltaic materials.

[1] Wolsky, S. P. and Zdanuk, E. J., editors. *Ultra Micro Weight Determination in Controlled Environments* **1969**.
[2] Pan, L. and Krim, J. *Rev. Sci. Instr.* **2012**, in press.

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Keeley Stevens
North Carolina State University

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