

Characterization of Glass Micropipette Thermal Probes for Scanning Thermal Microscopy

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Thermal probes have been used in atomic force microscopes (AFMs) to make measurements at the nanoscale. Scanning thermal microscopy (SThM) techniques can use thermal signals to make measurements of both topography and thermal properties. Key to quantifying these techniques is an understanding of the tip properties. Wollaston wire probes and thin-film batch-microfabricated probes have both been widely studied. However, the glass pipette tips from Nanonics Ltd. have not been thoroughly characterized. This work focuses on several important aspects of the tip: amplitude and phase response of the tip as a function of the AC power source frequency, higher harmonic responses, tip signal as a function of sample thermal conductivity, and a comparison of responses in both ambient conditions and vacuum. Scanning electron microscopes (SEM) images will be taken of the nano-tips for tip geometry characterization. Several tips will be analyzed to determine the consistency of the manufacturing process in producing similar characteristics among tips. These measurements will help increase understanding of measurements performed using these unique tips, and allow for more focused research plans.