

Abstract Submitted  
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**A versatile membrane-based calorimeter for studies of sub-microgram samples** STELLA TAGLIATI, ANDREAS RYDH, Stockholm University — We present a differential nanocalorimeter for milligram to sub-microgram samples as well as deposited thin films. The device is based on two free-standing SiN membranes that, combined with thin film heaters and temperature sensors, give a background heat capacity  $< 200$  nJ/K at 300 K, decreasing to sub-nJ/K at 10 K. The device has several unique features. i) In differential mode, used for small samples, the background at room temperature is reduced to 2 nJ/K. ii) The thermometers made of AuGe have high sensitivity,  $d \ln T / d \ln R \approx -1$ , for the entire temperature range down to 1 K. iii) The sample is placed in direct contact with the thermometer which is allowed to self-heat, and can thus be operated at high DC current to increase the resolution. iv) Data are acquired with a set of 8 synchronized lock-in amplifiers measuring DC, 1<sup>st</sup> and 2<sup>nd</sup> harmonic signals of heater powers and temperature oscillations with combined good absolute accuracy and high resolution. The design allows concurrent use of AC state steady and relaxation methods for general studies of specific heat, latent heat and dynamic heat capacity.

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