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**Using Superconducting Microwave Resonators to Measure the Dielectric Constant and Quality Factor of Ortho-Carborane-Capped Aluminum Nanoparticle Thin Films** JACOB BREWSTER, XANDER BENZIGER, PAUL JELLISS, DAVID WISBEY, Saint Louis University — Incorporating nanomaterials into electronic devices is an important challenge both commercially and for many areas of research. Lithographed superconducting microwave resonators (micro-resonators) are also important in many applications including quantum information and microwave kinetic inductance detectors. We use niobium micro-resonators as a tool to study thin films of ortho-carborane-capped aluminum nanoparticles. The thin films of nanoparticles were deposited in solution on micro-resonators and allowed to dry. The micro-resonators with and without these deposited thin films were then cooled to 50 mK using an adiabatic demagnetization refrigerator and the quality factor was measured using a vector network analyzer. By measuring the change in resonance frequency of covered and uncovered micro-resonators, the dielectric constant of the deposited ortho-carborane-capped aluminum nanoparticles thin film was extracted. This method could be used to test the dielectric constant and quality factor a wide variety of nanoparticle thin films.

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