

Abstract Submitted
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Apparatus for improved coupling of microwave energy with the tip-sample junction of a scanning tunneling microscope CHAD RHOADES, Dept. Electrical and Computer Engineering, Brigham Young University, MARK HAGMANN, NewPath Research L.L.C., BOYD RHOADES, BARCAD Design L.L.C. — Others couple microwave energy to or from the tip-sample junction of a scanning tunneling microscope (STM) using (1) a bias-Tee in the tip-circuit and/or sample-circuit, (2) a horn antenna, (3) a microwave cavity, (4) a coil, or (5) separate coaxial cables to the tip and sample. It is our objective to have the tip-sample junction act as a single lumped circuit element at the end of a single coaxial cable with all measurement and source connections made at the opposite end of the cable. To accomplish this, the sample is moved instead of the tip, and a section of miniature semi-rigid coaxial cable is held fixed just above the sample. The center conductor of the cable is attached to the STM tip and a fine gold wire connects the outer conductor to the sample. A novel circuit supplies the dc bias voltage, measures the dc tunneling current, and inputs or outputs microwave energy all at the opposite end of the cable. Thus, in this apparatus the microwave circuit and the DC circuit are each electrically closed in a well-defined manner without passing through the sample holder, other mechanical parts, or grounds in the system.

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