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Title:Power handling and responsivity of submicron wide superconducting coplanar waveguide resonators

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Abstract:The sensitivity of microwave kinetic inductance detectors (MKIDs) based on coplanar waveguides (CPWs) needs to be improved by at least an order of magnitude to satisfy the requirements for space-based terahertz astronomy. Our aim is to investigate if this can be achieved by reducing the width of the CPW to much below what has typically been made using optical lithography ($> 1 \mu\text{m}$). CPW resonators with a central line width as narrow as 300 nm were made in NbTiN using electron beam lithography and reactive ion etching. In a systematic study of quarter-wave CPW resonators with varying widths it is shown that the behavior of responsivity, noise and power handling as a function of width continues down to 300 nm. This encourages the development of narrow KIDs using Al in order to improve their sensitivity. © Springer Science+Business Media, LLC 2012.

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