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标题: Direct observation of the superconducting gap in a thin film of titanium nitride using terahertz spectroscopy
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摘要: We report on the charge carrier dynamics of superconducting titanium nitride (TiN) in the frequency range 90-510 GHz (3-17 cm(-1)). The experiments were performed on an 18-nm thick TiN film with a critical temperature of T-c = 3.4 K. Measurements were carried out from room temperature down to 2 K, and in magnetic fields up to B = 7 T. We extract the real and imaginary parts of the complex conductivity (sigma) over cap as a function of frequency and temperature, directly providing the superconducting energy gap 2 Delta. Further analysis yields the superconducting London penetration depth lambda(L). The findings as well as the normal-state properties strongly suggest conventional BCS superconductivity, underlined by the ratio 2 Delta(0)/k(B)T(c) = 3.44. Detailed analysis of the charge carrier dynamics of the silicon substrate is also discussed.
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