

318. Title:Microfabrication of diamond-based slow-wave circuits for mm-wave and THz vacuum electronic sources

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Abstract:Planar and helical slow-wave circuits for THz radiation sources have been made using novel microfabrication and assembly methods. A biplanar slow-wave circuit for a 650 GHz backward wave oscillator (BWO) was fabricated through the growth of diamond into high aspect ratio silicon molds and the selective metallization of the tops and sidewalls of 90 μ m tall diamond features using lithographically created shadow masks. Helical slow-wave circuits for a 650 GHz BWO and a 95 GHz traveling wave tube were created through the patterning of trenches in thin film diamond, electroplating of gold half-helices, and high accuracy bonding of helix halves. The development of new techniques for the microfabrication of vacuum electronic components will help to facilitate compact and high-power sources for terahertz range radiation.