利用指叉電容與蜿蜒線架構微小化高溫超導釔鋇銅氧濾波器

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摘 要

本研究主要利用指叉電容與蜿蜒線架構進行高溫超導微帶線濾波器之微小化。並依據磁通釘扎理論探討高溫超導體在各個溫度的臨界電流密度(critical current density)，推算出高溫超導體在不同溫度下的表面阻抗(surface resistance)與品質因數(Q-factor)。本文透過交錯耦合設計出窄頻微帶線濾波器，並且應用於IEEE 802.16e (2GHz~6GHz)全球互通存取協定(WiMAX)。模擬結果中心頻帶為2.47GHz、在插入損耗-3dB時其頻寬為20MHz，並在截止帶上產生一對傳輸零點，其濾波器的長乘寬約為6×6mm2。而實作方式是以RF濺鍍系統在雙面拋光、厚為0.5mm的鋁酸鑭(LaAlO3)基座上個別成長高溫超導釔鋇銅氧(YBa2Cu3O7-y)薄膜，再利用黃光製程製作成濾波器，最後放入銅製金屬封裝盒(copper housing)以封閉式循環氦氣致冷系統(closed-cycle optical temperature cryostat system)降溫至90K以下進行變溫量測。此外，本文也針對釔鋇銅氧薄膜進行通氧退火處理，並透過XRD分析發現在(006/005)的比值為 1.67時，釔鋇銅氧薄膜之臨界溫度可提升到91K。 關鍵字：高溫超導、指叉電容、蜿蜒線、釔鋇銅氧。

關鍵詞 : 高溫超導、指叉電容、蜿蜒線、釔鋇銅氧

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