

## 铌酸锂晶片热释电红外探测器设计及性能测试

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摘要：

通过红外热释电探测器工作原理的分析，采用合适的半导体加工工艺将铌酸锂晶体母材减薄，并对减薄后铌酸锂晶片进行溅射、镀膜将其制成红外敏感单元。选用CMOS放大器与匹配的电阻、电容组成前置放大电路，对热释电信号进行放大和转换；根据红外光谱吸收原理，在敏感单元前封装了窄带滤光片从而提高了敏感单元选择吸收的性能。将敏感单元、前置放大电路和窄带滤波片三部分封装在一个壳体内，红外探测器制作成功。设计了信号调理电路，对从探测器得到的热释电信号进行二次放大和滤波；搭建了探测器响应测试系统，对探测器的性能进行测试，测试验证了该探测器设计的合理性。

关键词：铌酸锂晶片；热释电探测器；红外吸收；电路设计；

## Design and performance test of IR pyroelectric detector based on Lithium niobate wafer

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**Abstract:**

Through analyzing infrared pyroelectric detector working principle, Lithium niobate wafer was thinned by suitable semiconductor processing technology. Subsequently, ultra-thin wafer was sputtered and made into sensing unit. Preamplifier circuit consists of COMS amplifier, matching capacity, matching resistance, which can amplify and convert pyroelectric current signal. Based on the infrared spectrum absorption principle, narrowband filter was packaged in the sensing unit to improve sensing unit selective absorption performance. The sensing unit, preamplifier circuit, narrow band filter were mounted into a shell and infrared detectors was made successfully. Signal conditioning circuit was designed to filter and amplify once more pyroelectric signal which come from detector. Set up detector response test system to test the performance of the detector and verify the rationality of the design of the detector. The results verify the rationality of the design.

**Keywords:** Lithium niobate wafer ; pyroelectric detector ; infrared absorption; circuit design;

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