

计量测试

## 激光干涉法测量硅高温环境下的线膨胀系数的实验研究

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摘要

利用中国计量科学研究院自行设计的基于激光干涉法材料线膨胀系数测量装置进行了材料线膨胀系数测量试验。该装置采用单频激光干涉, 对称光路设计, 其干涉仪分辨率小于1nm。实验过程中改进并完善了该装置, 重新设计了加热炉, 改进了实验方法, 使该装置在800K以上的高温环境下能进行材料线膨胀系数的测量。在800K到1200K温度范围内, 对单晶硅试样采用分段加热进行测量, 并对样品变化过程及测量结果作了分析, 得到了单晶硅线膨胀系数的曲线, 实现了在1200K环境下采用激光干涉法材料线膨胀系数的纳米级测量。

关键词 [线膨胀系数](#) [激光干涉仪](#) [单晶硅](#)

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## Measurement of linear expansion coefficient of silicon in high temperature with laser interferometric dilatometer

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**Abstract** The measurement of linear expansion coefficient of silicon was performed in high temperature with the high accuracy laser interferometric dilatometer developed by China National Institute of Metrology. The single frequency laser interferometer and symmetrical beam path are adopted in the dilatometer. The resolution of the interferometer is within 1nm. In order to make the measurement in the temperature of over 800 K, the furnace of this system was redesigned and the experiment method was modified. With the renovated system, the linear expansion coefficients of silicon were measured by stepwise heating in the temperature range of 800K~1200K. The changing process of specimens and the results of the measurement were analyzed. The linear expansion coefficient of silicon as a function of temperature was obtained. The measurement in nanometer level for the linear expansion coefficients of material was realized by laser interferometric method in 1200K.

**Key words** [linear expansion coefficient](#) [laser interferometer](#) [silicon](#)

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