

论文

照明用大功率发光二极管封装材料的优化设计

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摘要:

根据传热理论,建立了大功率发光二极管的有限元模型.选择了4种键合材料(高导热导电银胶、纳米银焊膏、大功率芯片键合胶、Sn70Pb30),4种基板材料(AI2O3、AlN、Al-SiC、铜钼合金).采用ANSYS有限元热分析软件进行了温度场仿真,得到了大功率发光二极管封装材料的最优选择.研究了基板厚度、芯片输出功率及外接热沉时对发光二极管结温的影响.结果表明:纳米银焊膏-AlN组合具有最优的散热效果|增加散热基板厚度提高散热能力的作用不大|单个发光二极管输出功率有限,应优化封装结构并采用多芯片阵列来满足照明级的需要|外接铝热沉能达到理想的散热效果.

关键词: 大功率发光二极管 封装 键合材料 基板材料 ANSYS 优化

Optimization Design on Packaging Materials of High-power LED for Lighting

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Abstract:

According to heat transfer theory, a finite element model of high-power light emitting diode(LED) was established. Four kinds of bonding materials (silver conductive adhesive with high thermal conductivity, nano-silver paste, power chip bonding adhesive, Sn70Pb30), and four kinds of substrate material (Al₂O₃, AlN, Al-SiC, copper-molybdenum alloy) were chosen. ANSYS finite element thermal analysis software was used to simulate temperature field, and the optimal choice of materials for high-power LED package was obtained. The influences of the substrate thickness, chip output power and external heat sink on the LED junction temperature were studied. The results show that the nanometer silver soldering paste-AlN has the most superior radiation effect the increase of the substrate thickness will not increase the head dissipation capability obviously|because the signal LED output power is limited, the packaging structure should be optimized and the multi-chip array needs to be used to the illumination requirement|the external aluminum heat-sinking is able to achieve the ideal heat-sinking effect.

Keywords: High power Light Emitting Diode(LED) Packaging Bonding materials Substrate materials

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- ▶ 封装
- ▶ 键合材料
- ▶ 基板材料
- ▶ ANSYS
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