Optical Scanning Technique Applied to the Backside Imaging of Silicon ICs

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Abstract

The purpose of this thesis is based on optical scanning systems to probe the inner structures of silicon IC chips by compendious and valid methods. Except for high resolving power, the design introduces more consideration to the present of silicon substrate, whose high refractive index influences the imaging process results strongly. In our experimental steps, we first make use of simulation software to help designing the optical route and introduce each component involved. Next, we compare it with experimental results and try to improve the image qualities by digital image processing methods. Up to now, we have obtained clear pictures for a structure under 5μm, and based on the image resolution is estimated around 1μm。

In combination this scanning system, we study the thermal image originating from the bandgap absorption of silicon in order to find out the defects in the IC circuits. Experimentally, we scan a 0.09μm process chip and observe apparent differences before and after a voltage being applied to this chip. It is prominent that we can apply this technique for inspection to silicon IC chip examination by the thermal imaging methods.