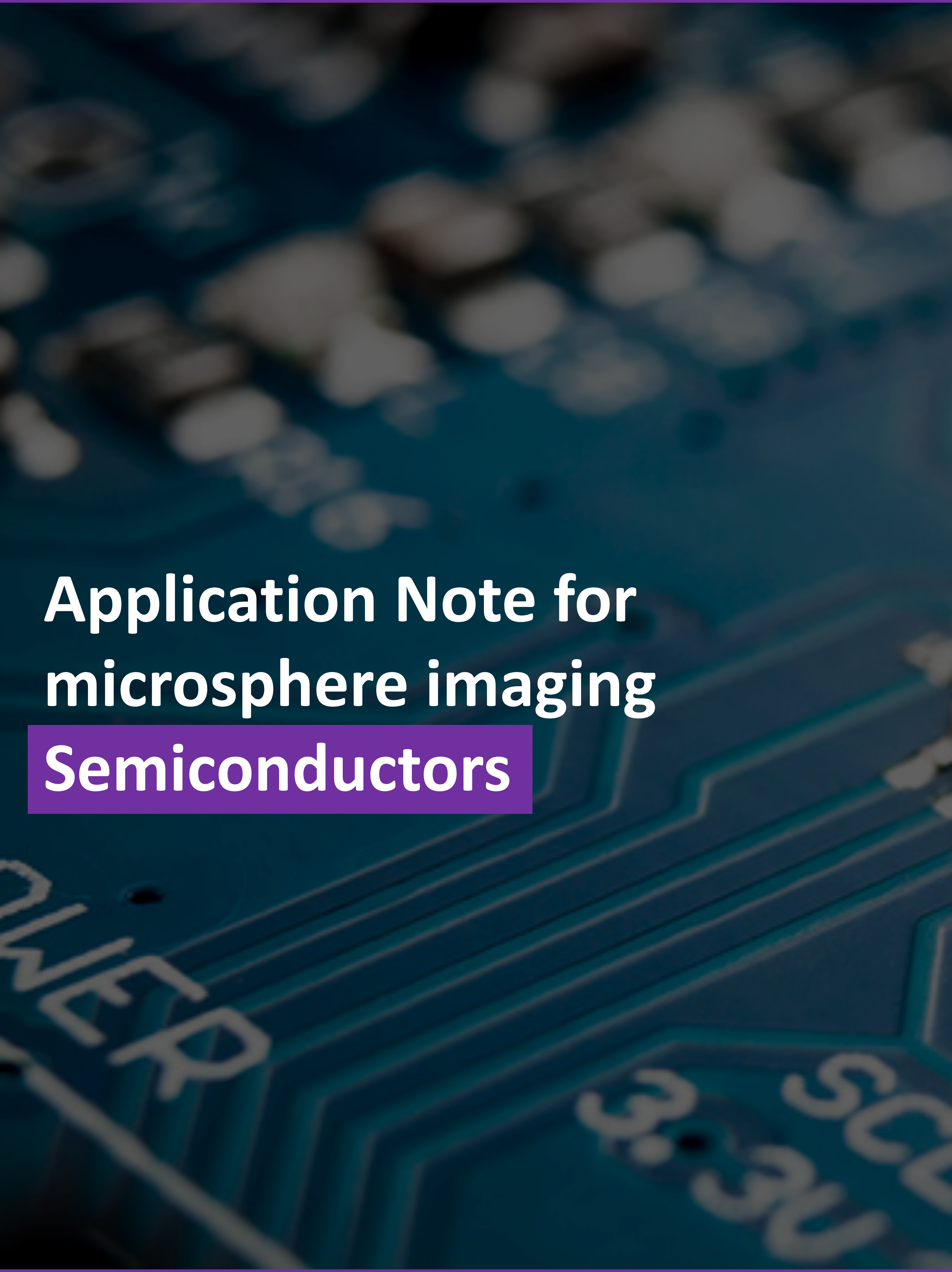


Application Note for microsphere imaging

Semiconductors

LIGNANOWISE

NANORO

High Performance Microprocessor

Introduction

The following images are from a common high-performance, high-density microprocessor and demonstrate the advantage of using SMAL imaging for off-line microelectronics imaging.

The spatial resolution of SMAL allows sub-diffraction-limit features to be resolved (fig.2) which would otherwise be unresolved with conventional optical microscopy (fig.1).

This allows users to optically inspect samples for nanometric faults that may occur from fractures or filament bridges. The users can also check features are the intended size, shape, dimensionality and also that they are as per drawing / layout with all the benefits that optical microscopy brings: it is quick, will not damage the sample, and is in full colour.

Finally, in comparison with AFM or bench top SEM: these techniques resolve surface features only, whereas optical methods are able to view inner layers though transparent materials such as silica (SiO_2) and some polymers. This can provide additional advantages in fault finding and analysis.

100x oil immersion vs. SMAL lens

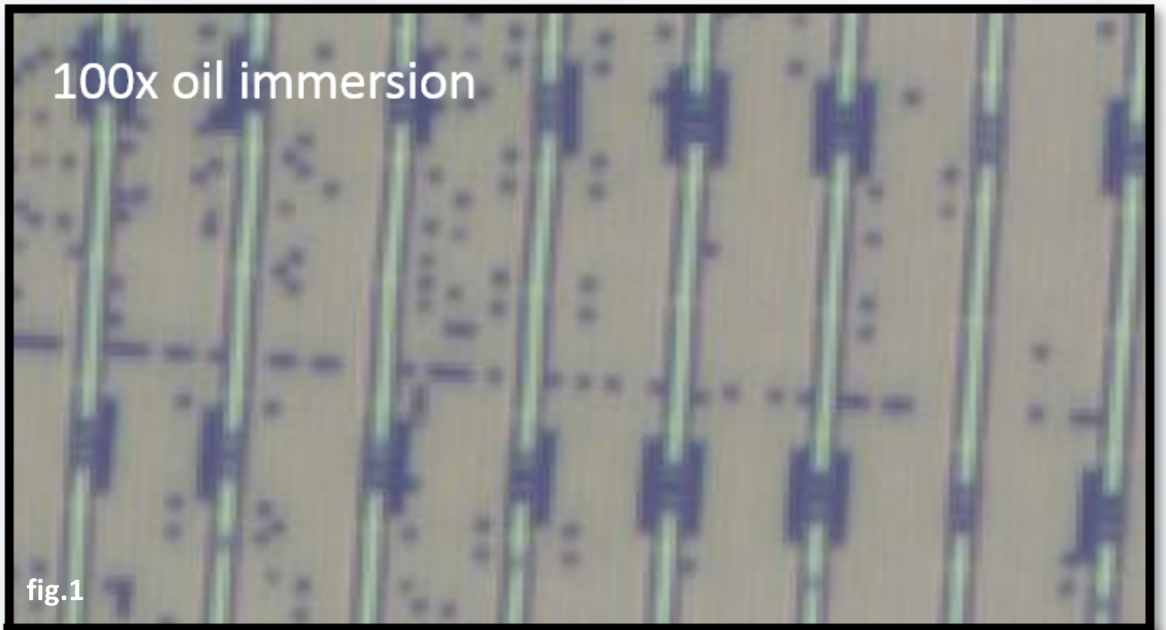


fig.1

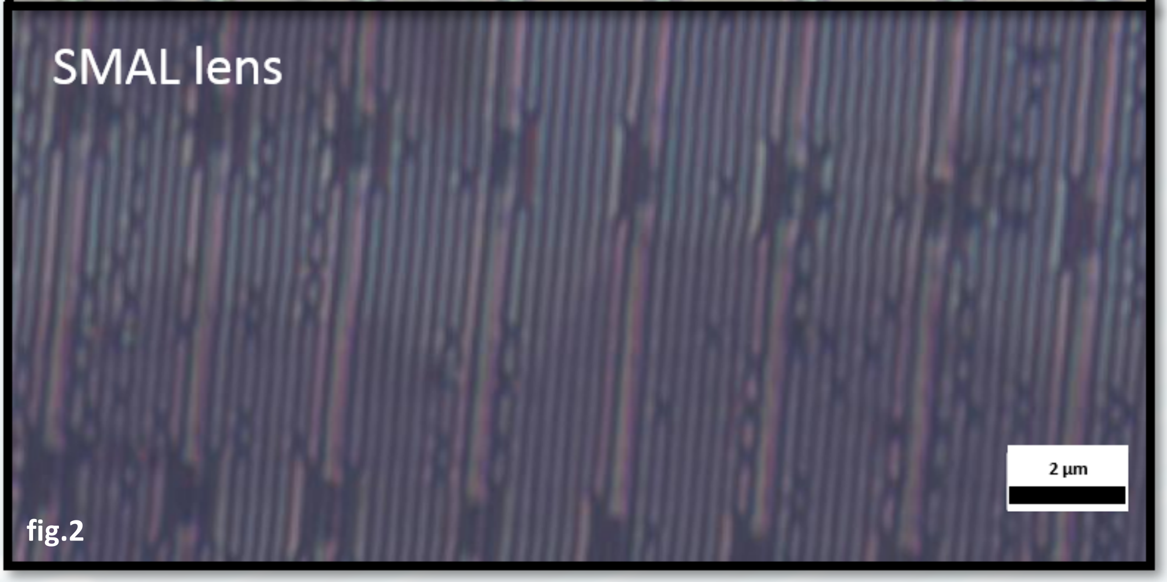


fig.2

The microprocessor embodies periodic 100 nm features which are not visible with a 100x oil immersion objective lens (fig. 1). However, the SMAL lens allow a clear observation and imaging of the 100 nm features (fig. 2).

Resolution calculated over 100 measurements shows an average resolution of 80 nm. See technical note TN1 on resolution for further information.

100x oil immersion vs. SMAL lens

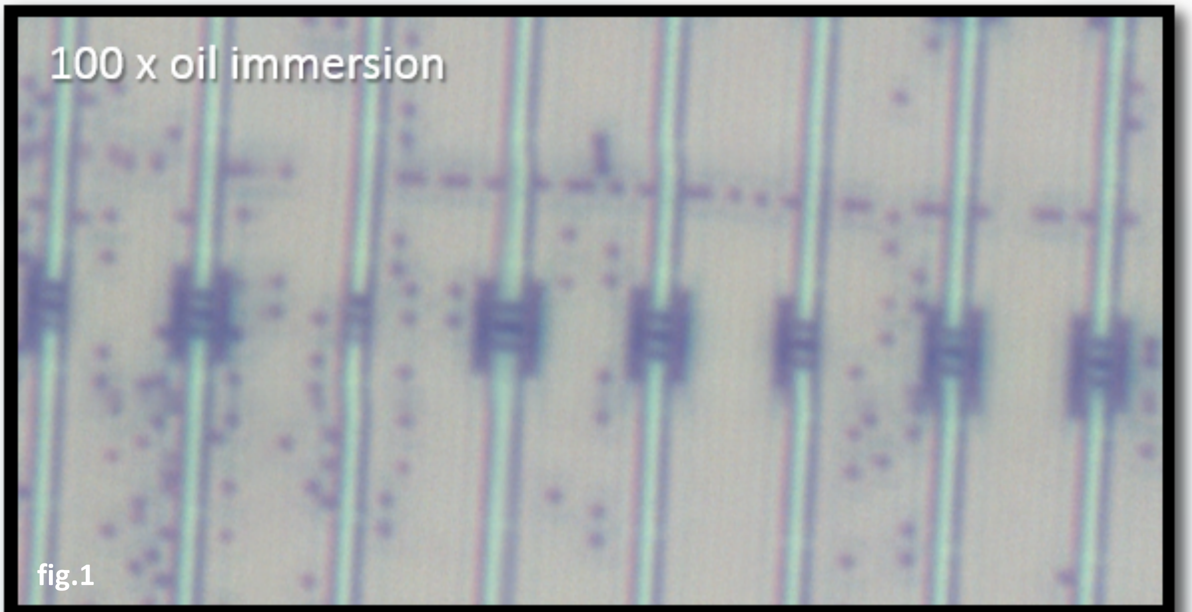


fig.1

fig.2

The microprocessor embodies periodic 100 nm features which are not visible with a 100x oil immersion objective lens (fig. 1). However, the SMAL lens allow a clear observation and imaging of the 100 nm features (fig. 2).

Resolution calculated over 100 measurements shows an average resolution of 80 nm. See technical note TN1 on resolution for further information.

50 nm optical imaging on an integrated circuit

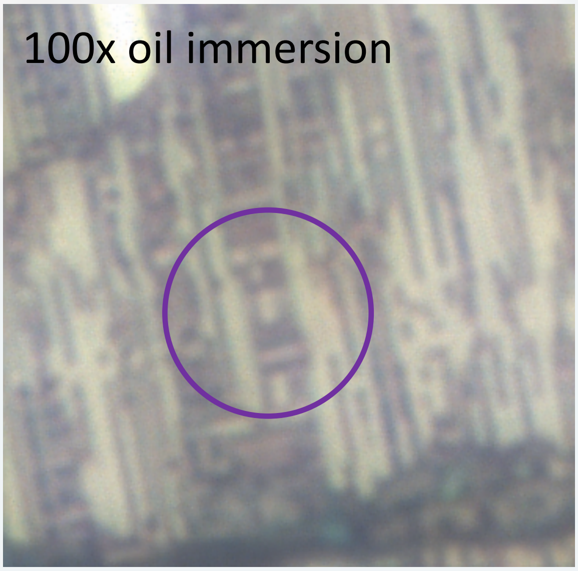


fig.6

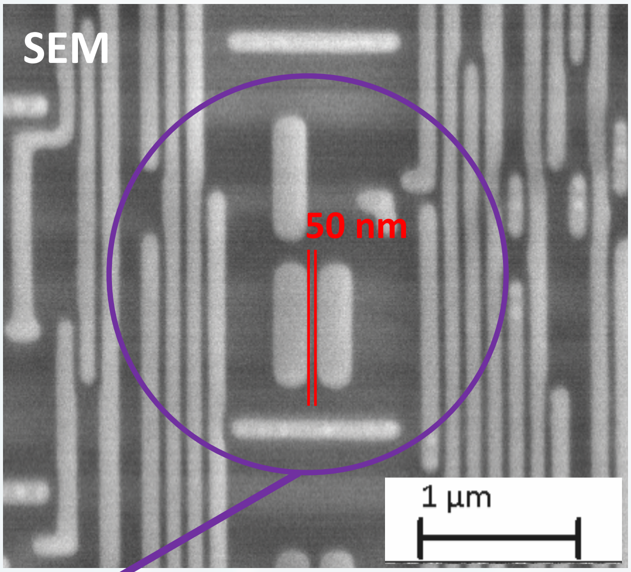
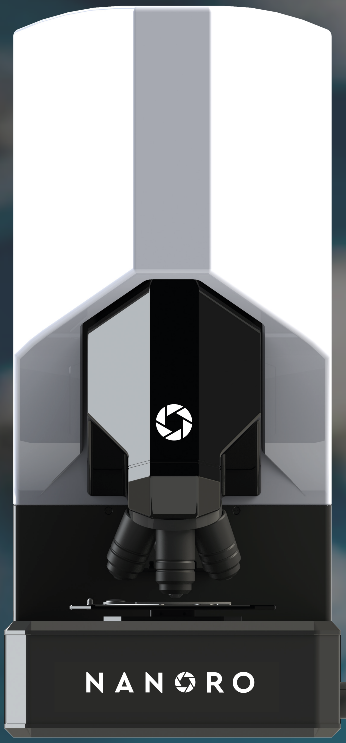


fig.7

fig.8

Fig. 7 shows a 50 nm gap between two cigar shaped features on an integrated circuit taken by SEM. Fig. 6 shows how the gap and cigars are not resolved with 100x oil immersion microscopy. However, fig. 8 shows the cigar shapes and gap can be imaged using SMAL lens technology.



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