

References

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3- 79 Single Event Effect Mapping System at the IMP Micro-beam

Guo Jinlong, Liu Tianqi, Du Guanghua, Liu Jie, Wu Ruqun and Liu Wenjing

The micro-beam is a beam of micrometer or sub-micrometer dimension, which allows precise defined quantities of ions to be introduced at precisely defined location. It has been a powerful tool for single event effects (SEE) study. At the IMP micro-beam facility, we have preliminarily built a SEE mapping system to study the microscopic sensitive areas of SEEs on integrated chips.

In order to map the SEE distribution with the ion irradiation, the SEE event signal (E) from the device under test is detected by the analog input of the SEE mapping system; through the SEE mapping software control, the beam is scanned with the magnetic scan coil of the microbeam facility and the beam position of the scan coil of the microbeam facility is used to register the SEE position (X, Y); Finally, the SEE distribution is drew with a pseudo-color bit image online using (N_E, X, Y) , where N_E is the number of occurrence of SEE type E at beam position (X, Y). The input of the SEE mapping system can support simultaneously detection of up to three SEE signals.

Recently, a micro-beam experiment to explore the single event upset (SEU) in SEE was performed. Totally 73722 ions were scan-irradiated over an area of $468 \mu\text{m} \times 403 \mu\text{m}$, and finally 633 SEU events were detected. The left image in Fig. 1 shows the microscopic SEU sensitive image on the tested FPGA of Actel Pro ASIC Plus APA600, the black dots represent the relative location where SEU occurs. In addition, the allocation of the configured register resources is shown on the right side in Fig. 1, it's obvious that the SEU distribution trend matches with the structure of SRAM. Overall, the SEE mapping system can be used to map the sensitive area of single event effects in microelectronics.

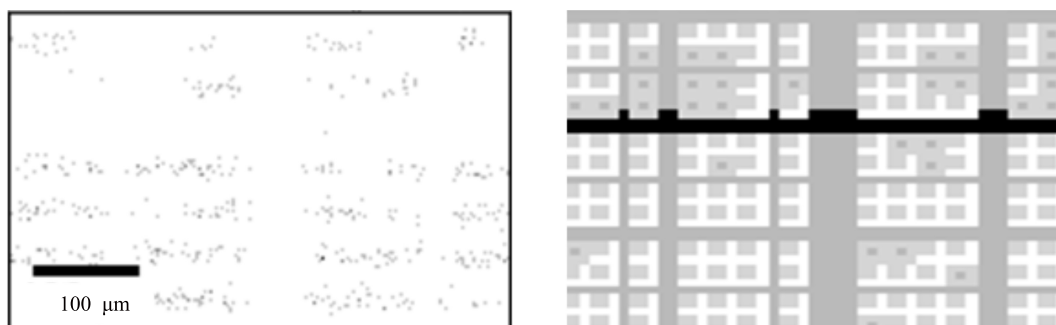


Fig. 1 The image on the left shows the distribution of 633 SEU induced by the micro-beam, and the image on the right is the allocation of the register resources.