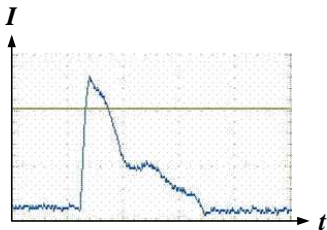


Physics of Blowing Polysilicon Fuses *with Analog Devices*

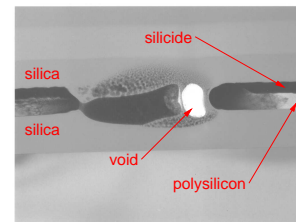
William Lee, Andrew Fowler and Michael Vynnycky

MACSI, University of Limerick

Polysilicon fuses are solid state, micron sized devices incorporated into integrated circuits. They are blown, not as a safety measure, but as a programming step to specialise the integrated circuit or tune its performance. The voltage needed to blow the fuse depends not only on the fuse design but also on the environment and can only be determined by experiments taking weeks or months to carry out. Analog devices approached MACSI to help understand and simulate the physics of fuse blowing with the eventual aim of replacing experimental characterisation of fuses by a more rapid simulation approach.



Current time graph for a blowing fuse



Microstructure of a blown fuse.

Note: Scales have been omitted from graphs for confidentiality reasons.

Status: Ongoing. Currently analysing circuit data provided by Analog devices to improve model of circuit surrounding fuse.

Progress

- Physical basis of fuse blowing explained
- Low dimensional model of fuse blowing: qualitative accuracy

Outputs

- ESGI62 Study group report: An investigation into the physics of blowing polysilicon fuses.
- ECMI50 talk: Blowing fuses and etching lead crystal glass.

Future Work

- Model external circuit used to blow fuse.
- Develop high dimensional model.
- Refine parameters with inverse modelling.