
SILICON-ON-INSULATOR TECHNOLOGY: MATERIALS TO VLSI

3rd Edition

SILICON-ON-INSULATOR TECHNOLOGY: MATERIALS TO VLSI

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by

Jean-Pierre Colinge
University of California



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Preface

The first edition of this book was published in 1991. In the preface one can read *"At first SOI technology was only considered as a possible replacement for SOS in some niche applications. It has, however, been discovered since then that thin-film SOI MOSFETs have excellent scaling properties which make them extremely attractive for deep-submicron ULSI applications"*. Six years later one could read in the preface of the second edition: *"SOI technology has boomed since the first edition... SOI chips are commercially available and SOI wafer manufacturers have gone public. SOI has finally made it out of the academic world and is now a big concern for every major semiconductor company."* All this was true, but six years later, at the time of this third edition, these sentences sound so innocent and unaware of a revolution yet to come. The end of the 20th century turned out to be a milestone for the semiconductor industry, as high-quality SOI wafers suddenly became available in large quantities. From then on, it took only a few years to witness the use of SOI microprocessors in personal computers and SOI audio amplifiers in car stereo systems. Chances are the watch you are wearing around your wrist has an SOI chip.

This book retraces the evolution of SOI materials, devices and circuits over a period of roughly twenty years. Twenty years of progress, research and development during which SOI material fabrication techniques have been born and abandoned, devices have been invented and forgotten, sometimes to be re-discovered and re-named a few years later, and during which SOI circuits have little by little proven they could outperform bulk CMOS in every possible way.

*«La vie ne fait pas de cadeau. Et nom de dieu c'est triste Orly le dimanche.
Avec ou sans Bécaud.» - Jacques Brel, Orly, 1977*

Acknowledgements

This book is dedicated to those pioneers who kept on believing that developing exotic devices and theories for the most unreliable, defective, rare and expensive form of silicon substrates could some day lead to practical, or even mainstream applications. It is also dedicated to those individuals who managed to render SOI wafers reliable, defect-free, abundant and relatively inexpensive, and to those who demonstrated that a hundred million SOI transistors could do the same job as a hundred million bulk transistors, only faster and with lower energy consumption.

In particular, I want to dedicate this book to Akira, Alberto, Alexei, André, Anne, Bernard, Bohdan, Carlos, Cor, Daniel, Danielle, Denis, Dimitris, Duy-Phach, Edval, Eric, Fernand, Herman, Gracie, Guido, Guy, Igor, Isabelle, Jean-Marc, Jean-Paul, Jean-Pierre, Jae-Woo, Jian, João Antonio, Jong-Tae, Kuntjoro, Laurent, Luis, Marcelo, Maurice, Michel, Minghui, Pascale, Paul, Peter, Pierrot, Renaud, Shang-Yi, Sorin, Stefan, Tamara, Ted, Ulf, Valeriya, Vincent, Vitaly, Weize, Xavier, and Xiaohui: working with you has been a pleasure and a privilege. And of course, I have special thanks to Cindy who edited the manuscript of this book.

To my Parents, Wife and Children