

Technology Profile Fact Sheet

Title: Circuit Preparation for Imaging of Cell Structures Represented in Polysilicon Active Layers and First Level Metal.

Aliases: Reverse Engineering Program B33

Technical Challenges: Traditional methods attempt to remove the layers of metal and oxide from the topside of the die. Since the number of layers of metal presently can be up to nine, the removal of upper levels is difficult to accomplish without damaging the underlying features. In particular, accuracy of the grinding techniques must be within 100's of angstroms across a square centimeter in order to acquire images of the whole die.

Description: The invention removes the silicon with a preferential silicon etch. This method bypasses the need to remove the top layers using the traditional method, thereby offering easier access to the cell structures in first level metal, poly and active layers. Since the silicon removal results in easy access to the poly and first layer metal, images can be taken without the difficult/sometimes impossible top layer grinding procedure. Also, since the silicon is removed the active areas can't cause blooming in the electron microscope images.

The removal of the silicon results in a flat surface using this method, and the upper layers of metal do not need to be removed. Since the active layers are implanted, the oxide wells show up after removal of the silicon. Therefore the active layer also can be imaged without staining. Additionally, since the die is embedded in a handling wafer, normal wafer processing tools can be used for circuit preparation.

Demonstration Capability: A number of different demonstration dies have been de-processed.

Potential Commercial Application(s): Reverse engineering is a field that is normally thought of as a fringe industry. This process may be valuable to integrated processing labs that do reverse engineering to protect their circuits from copying.

Patent Status: Patents 7183123 and 7019530 have been issued by the USPTO.

Reference Number: 1349