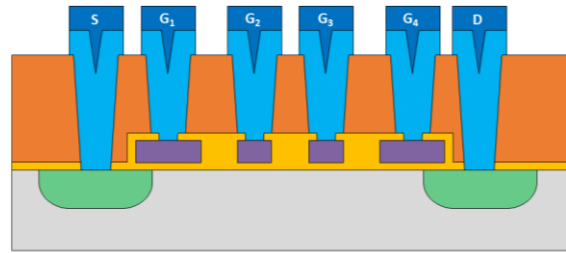
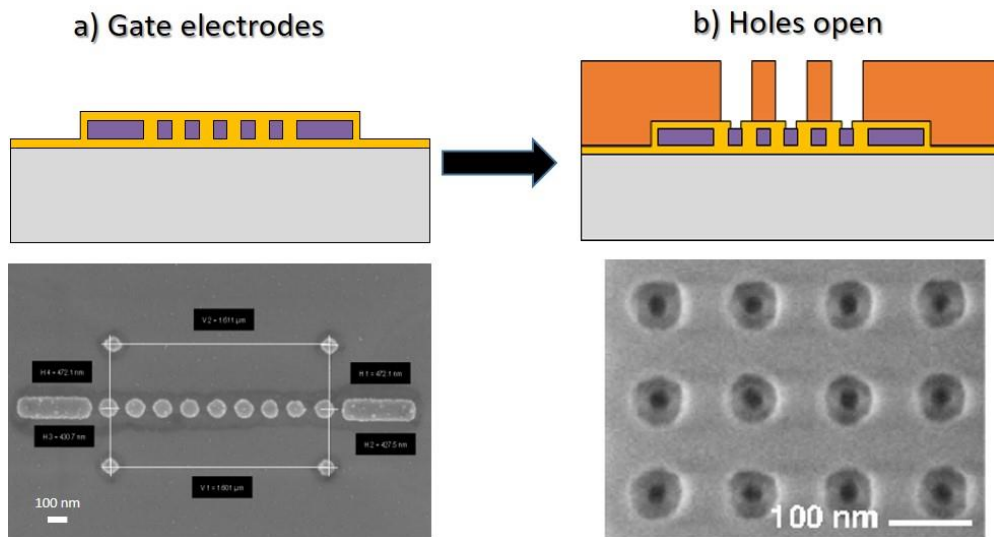


## Contact test structures for quantum manufacturing



### Overview

The requirements for contact hole patterning in the manufacturing of semiconductor quantum devices are very stringent, especially when it is needed to contact an array of high density of electrodes. We offer the possibility to deliver test structures designed specifically to test new advances in contact patterning for qubit manufacturing, primarily aimed at process equipment companies. The pilot line for fabrication of semiconductor quantum devices can deliver test structures designed on purpose to characterize litho, etching and metallization processes. Characterization facilities at the pilot line can be used to benchmark the results.



**Figure 1.** Example of a base test structure to which test contact patterning. a) Arrays of metal gates. SEM image shows an example of a gate array fabricated at CSIC pilot line. b) Holes opening prior to metallization. SEM images show hole contact shrink developed at CEA pilot line

**Field of Application and applied technology:** Manufacturing of semiconductor spin qubits

### Specifications

- Sample size: from coupons to 150 mm wafer
- Substrate materials: Silicon
- Type of test structures: Structures can be designed on purpose. Typically, the manufacturing will be following the standard process flow for manufacturing quantum semiconductor devices, up to the levels of gate electrode definition and gate stack contact hole opening.