

## **Heteroepitaxial growth of vacuum-evaporated Si-Ge films on nanostructured silicon substrates**

### **Abstract**

In this study, a low-cost vacuum-evaporated technique is used in the heteroepitaxial growth of Si-Ge films. Three different surface variations are employed: i.e. polished Si, Si micropylamids and Si nanopillars profiles. A simple metal-assisted chemical etching method is used to fabricate the Si nanopillars, with Ag acting as a catalyst. Following deposition, substrates are subjected to post-deposition thermal annealing at 1000o C to improve the crystallinity of the Ge layer. Optical and morphological studies of surface area are conducted using field emission scanning electron microscopy (FE-SEM), Energy Dispersive X-ray (EDX), Raman spectroscopy and infrared spectroscopy. From the infrared spectroscopy analysis, the energy bandgap for Si-Ge films is estimated to be around 0.94 eV. This high-quality Si-Ge film is most favourable for optics, optoelectronics and high-efficiency solar cell applications.

### **Keywords**

Heteroepitaxial growth; Metal assisted chemical etching; Nanostructured Si; Silicon germanium; Thermal evaporation