Silicon Nanowires obtained by nanosphere self-assembly: A VAMAS Interlaboratory comparison by Scanning Thermal Microscopy

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The Versailles Project on Advanced Materials and Standards (VAMAS) has been established by the G7 in 1982 and supports the world trade in products which depend on advanced materials technologies, through International collaborative projects aimed at providing the technical basis for harmonized measurements, testing, specifications, and standards. Its work is structured in more than 15 Technical Working Areas devoted to the standardization and measurements of advanced materials. The participants are selected on a voluntary basis and must represent at least the three continents (www.vamas.org). The aim of this international interlaboratory comparison is to determine quantitatively the thermal properties of arrays of silicon nanowires measuring effusivity and thermal conductance through Scanning Thermal Microscopy (SThM), supported by Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) measurements of periodicity, diameter, and height.. The samples, fabricated at INRiM by polystyrene nanosphere self-assembly and Metal Assisted Chemical Etching or Cryo Deep Reactive Ion Etching (Fig. 1), will be circulated among the interested partners starting from September 2024 for the SThM measurements. Data will be evaluated by Czechian Institute of Metrology (CMI) and INRiM and included in the VAMAS final report of the project.

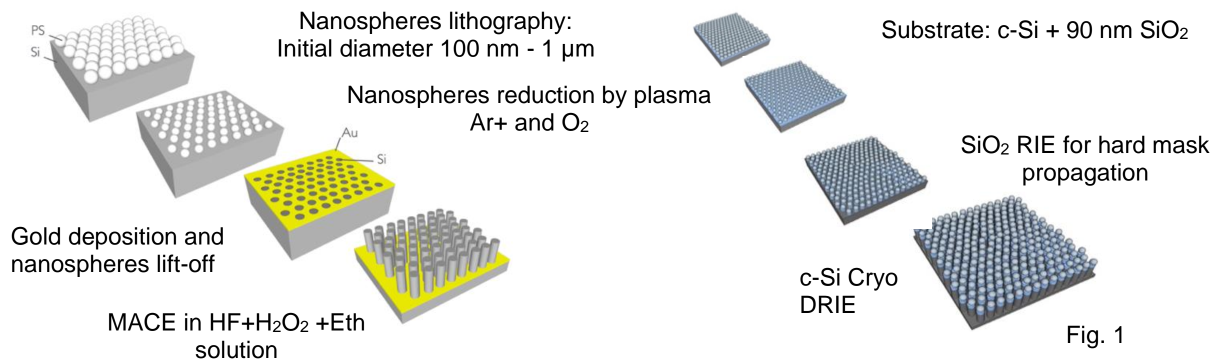

Fig. 1: Left: fabrication of porous silicon nanowires by nanosphere lithography and Metal Assisted Chemical Etching. Right: fabrication of crystalline nanowires by nanosphere lithography and Cryo DRIE