| ESRF | **Experiment title:** TAILORING BLOCK-COPOLYMER SELF-ASSEMBLY BY ULTRA-RAPID THERMAL ANNEALING: A GISAXS STUDY | **Experiment number**: MA-2270 |
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**Report:**

The experimental results have been published in the paper

T. J. Giammaria, F. Ferrarese Lupi, G. Seguini, M. Perego, F. Vita, O. Francescangeli, B. Wenning, C. K. Ober, K. Sparnacci, D. Antonioli, V. Gianotti, M. Laus, "Micrometer-scale ordering of silicon-containing block copolymer thin films via high-temperature thermal treatments", *ACS Appl. Mater. Interfaces* **8**, 9897 (2016),

whose abstract is reported below

*Block copolymer (BCP) self-assembly is expected to complement conventional optical lithography for the fabrication of next-generation microelectronic devices. In this regard, silicon-containing BCPs with a high Flory−Huggins interaction parameter (χ) are extremely appealing because they form high-resolution nanostructures with characteristic dimensions below 10 nm. However, due to their slow self-assembly kinetics and low thermal stability, these silicon-containing high-χ BCPs are usually processed by solvent vapor annealing or in solvent-rich ambient at a low annealing temperature, significantly increasing the complexity of the facilities and of the procedures. In this work, the self-assembly of cylinder-forming polystyrene-block-poly(dimethylsiloxane-random-vinylmethylsiloxane) (PS-b-P(DMS-r-VMS)) BCP on flat substrates is promoted by means of a simple thermal treatment at high temperatures. Homogeneous PS-b-P(DMS-r-VMS) thin films covering the entire sample surface are obtained without any evidence of dewetting phenomena. The BCP arranges in a single layer of cylindrical P(DMS-r-VMS) nanostructures paralleloriented with respect to the*

*substrate. By properly adjusting the surface functionalization, the heating rate, the annealing temperature, and the processing time, one can obtain correlation length values larger than 1 μm in a time scale fully compatible with the stringent requirements of the microelectronic industry.*