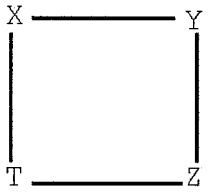
-The presence of entities resulting from monomers of the family of (I), silicon or germanium carbide precursors after plasma treatment or treatment by pyrolysis, that make it possible to obtain hard masks during the mask etching step.

-The orientation of the domains during the self-assembly of such block copolymers does not require preparation of the support (no neutralization layer), the orientation of the domains being governed by the thickness of the block copolymer film deposited.

-Selective elimination of one or other of the constituent domains of these diblock copolymers which makes possible the production of positive or negative resins, that can be used in the fields of lithography, porous membranes or catalyst supports or magnetic particle supports.

Summary:

In an aspect, there is provided a nanostructured assembly process using a composition comprising a diblock copolymer, one of the blocks of which results from the polymerization of at least one monomer corresponding to the following formula (I):

(I) 

where X= $Si(R_1,R_2)$; $Ge(R_1,R_2)$

Z= $Si(R_3,R_4)$; $Ge(R_3,R_4)$; O; S; $C(R_3,R_4)$

Y= O; S; $C(R_5,R_6)$

T= O; S; $C(R_7,R_8)$

with R_1=R_2 and R_3=R_4 and R_5=R_6 and R_7=R_8 are selected from hydrogen, linear, branched or cyclic alkyl groups, with or without heteroatoms, and aromatic groups with or without heteroatoms,

the other block comprising a vinyl aromatic monomer, and comprising the following steps:

- dissolving the block copolymer in a solvent,
- depositing this solution on a surface,
- annealing.

In another aspect, there is provided a random copolymer comprising entities (I) as defined above and styrene.

In another aspect, there is provided the use of the process as defined above, in the field of lithography, and the production of porous membranes, of catalyst supports or of magnetic particle supports.

In another aspect, there is provided a mask of positive or negative resin of a film obtained according to the process as defined above and treated by a plasma that specifically degrades the specific domains of one of the two blocks of the block copolymer.

Detailed description:

The term "surface" is understood to mean a surface which can be flat or non-flat.

The term "annealing" is understood to mean a step of heating at a certain temperature that enables the evaporation of the solvent, when it is present, and that allows the establishment of the desired nanostructuring in a given time (self-assembly).

The term "annealing" is also understood to mean the establishment of the nanostructuring of the block copolymer film when said film is subjected to a controlled atmosphere of one or more solvent vapours, these vapours giving the polymer chains sufficient mobility to become organized by themselves on the surface. The term "annealing" is also understood to mean any combination of the abovementioned two methods.