In addition to the advantages described above, the process of the disclosure also makes it possible to advantageously reduce interface roughness defects. Indeed, for example but non-exhaustively, in the case of lamellar morphology, a rough interface (denoted LER for "line edge roughness") can be observed when the structuring is not absolutely completed (which would require, for example, exceeding the time assigned for an industrial process, using annealing for a longer time) for the compositions not included in the disclosure. This roughness can also be observed if the desired film thicknesses are too large for given compositions, or else for example in the case of thermal annealing if the temperature required to establish the structuring is too high with respect to the heat stability of the composition. The disclosure makes it possible to overcome this problem given that the compositions described by the disclosure very rapidly complete their structuring, for large film thicknesses, with few or no defects, and for annealing temperatures that are lower than those required for block copolymers of equivalent dimensions not described by the disclosure.

Summary:

The disclosure relates to a process which makes it possible to reduce defects of an ordered film of a composition comprising at least one block copolymer on a surface, and which comprises the following steps:

- mixing a composition comprising a block copolymer in a solvent, this composition exhibiting a product $\chi_{effective}*N$ of between 10.5 and 40 at the structuring temperature;
- depositing this mixture on a surface, which is optionally pre-modified, whether it is organic or inorganic;
- curing the mixture deposited on the surface at a temperature between the highest Tg (glass transition temperature) of the

block copolymer(s) and their decomposition temperature such that the composition can structure itself after evaporation of the solvent without degrading.

In an aspect, there is provided a process for reducing the number of defects of an ordered film of a composition comprising a di-block copolymer on a surface, and comprising the following steps:

- mixing a composition comprising a di-block copolymer in a solvent, in which the diblock copolymer has a structure A-b-(B-*co*-C) wherein the block A consists of a single monomer A, the block B-*co*-C itself consisting of two monomers B and C, C possibly being A, this composition exhibiting a total overall Flory-Huggins parameter/degree of polymerization product χeffective*N of between 10.5 and 40 at the structuring temperature once the solvent has been evaporated off,
- depositing this mixture on a surface,
- curing the mixture deposited on the surface at a temperature between the highest Tg of the di-block copolymer(s) and their decomposition temperature such that the composition can structure itself after evaporation of the solvent.

In another aspect, there is provided an ordered film obtained according to the process as defined above, which can be used in particular as masks in the lithography field.

In another aspect, there is provided a mask obtained from an ordered film as defined above.

Detailed description :

As regards the composition used in the process in accordance with the invention, any block copolymer, or blend of block copolymers, may be used in the context of the invention, provided that the product χeffective*N of the composition comprising a block copolymer is between 10.5 and 40, preferably between 15 and 30,

and even more preferably between 17 and 25 at the structuring temperature of this composition.

The χeffective can be calculated by means of the equations of Brinke et al., Macromolecules, 1983, 16, 1827-1832. N is the total number of monomeric entities of the block copolymer.

According to a first preference, the composition comprises a triblock copolymer or a blend of triblock copolymers. According to a second preference, the composition comprises a diblock copolymer or a blend of diblock copolymers. Each block of the triblock or diblock copolymers of the composition may contain between 1 and 3 monomers, which will make it possible to finely adjust the χeffective*N between 10.5 and 40.

The copolymers used in the composition have a molecular weight at the peak measured by SEC (Size Exclusion Chromatography) of between 100 and 500 000 g/mol and a dispersity of between 1 and 2.5, limits included, and preferably of between 1.05 and 2, limits included.

The block copolymers can be synthesized by any technique known to those skilled in the art, among which may be mentioned polycondensation, ring opening polymerization or anionic, cationic or radical polymerization. When the copolymers are prepared by radical polymerization, the latter can be controlled