~~What is claimed is:~~

~~1.~~ **CLAIMS**

1. A method of manufacturing of an extreme ultraviolet ~~substrate~~mask blank comprising:

~~providing a glass-ceramic block;~~

forming a glass-ceramic substrate from a glass-ceramic block, the glass-ceramic block~~; and~~

having a high spatial frequency roughness (HSFR) value;

~~depositing~~forming a liquid planarization layer on the glass-ceramic substrate~~.~~ using flowable chemical vapor deposition; and

~~2. The method as claimed in claim 1 further comprising forming a hardened layer by~~ curing the planarization layer to form a hardened planarization layer,

wherein the hardened planarization layer has a surface roughness of under 0.6 nm rms and

an HSFR value lower than the HSFR value of the glass-ceramic substrate.

~~3. The method as claimed in claim 1 wherein depositing the planarization layer includes depositing the planarization layer of silicon, oxygen, and carbon.~~

~~4~~2. The method as claimed in claim 1 wherein ~~depositing~~ the planarization layer ~~includes forming the planarization layer with a surface roughness of under 0.6 nm rms~~comprises silicon, oxygen, and carbon.

~~5.~~3 The method as claimed in claim 1 wherein ~~forming the~~ curing comprises using an ultraviolet curing process.

4. The method as claimed in claim 1 wherein the glass-ceramic substrate ~~includes forming the glass-ceramic substrate having a~~ has a coefficient of thermal expansion of ± 0.007 x 10^{-7}/K.

~~6. An integrated~~5. The method of claim 1, wherein forming the planarization layer includes depositing a layer comprising silicon, oxygen, and carbon and curing the layer to form the hardened planarization layer on the glass-ceramic substrate.

6. The method of claim 5 wherein the glass-ceramic substrate has a coefficient of thermal expansion of ± 0.007 x 10^{-7}/K.

7. The method of claim 5, wherein the hardened planarization layer planarizes a surface of the glass-ceramic substrate without changing properties the glass-ceramic substrate.

8. The method of claim 5, wherein curing comprises steam or ozone curing.

9. The method of claim 5, wherein curing comprises ultraviolet curing.

10. The method of claim 5, wherein the glass-ceramic substrate comprises lithium alumino-silicate.

11. The method of claim 5, further comprising forming a multilayer stack which reflects extreme ultraviolet ~~mask production system comprising:~~

~~a vacuum chamber for placing a glass-ceramic substrate in a vacuum;~~

~~a first deposition system for depositing a planarization layer over the glass-ceramic substrate; and~~

~~a second deposition system for depositing a multi-layer stack on the planarization layer without removing the glass-ceramic substrate from the vacuum.~~

~~7. The system as claimed in claim 6 further comprising a carrier handling system for positioning the glass-ceramic substrate into the vacuum chamber.~~

~~8. The system as claimed in claim 6 wherein the first deposition system is for depositing the~~ light on the hardened planarization layer~~,~~.

12. The method of claim 1, wherein the planarization layer ~~includes silicon, oxygen, and carbon.~~

~~9. The system as claimed in claim 6~~is a SiN based film, the method further comprising ~~a cure system for forming the hardened layer from~~converting the SiN based film to a SiO/SiO_2 hardened planarization layer.

13. ~~10.~~ The ~~system as claimed in~~ method of claim ~~6~~1, wherein the ~~first deposition system is for depositing the planarization layer having a surface roughness under 0.6 nm rms.~~

~~11. An extreme ultraviolet lithography mask system comprising:~~

~~a~~ glass-ceramic substrate~~; and~~ comprises lithium alumino-silicate.

14. ~~a hardened layer having a layer thickness 207~~ The method of ~~100 angstroms to 10 micrometers.~~

~~12. The system as claimed in~~ claim ~~11 wherein~~1 further comprising forming a multilayer stack which reflects extreme ultraviolet light on the hardened ~~layer includes silicon, oxygen, and carbon.~~planarization layer.

~~13. The system as claimed in claim 11 wherein the hardened layer includes a surface roughness of under 0.6 nm rms.~~

~~14. The system as claimed in claim 11 wherein the glass-ceramic substrate includes a coefficient of thermal expansion of ± 0.007 x 10^{-7}/K.~~

~~15. The system as claimed in claim 11 wherein the hardened layer includes silicon oxide.~~