CLAIMS:

1. A method of fabricating an interconnect structure for an integrated circuit, the method comprising:
providing a previous layer metallization structure comprising an alternating metal line and dielectric line grating pattern having a first direction;
forming a sacrificial structure above the grating pattern;
replacing the portions of the sacrificial structure above and aligned with the metal lines of the grating pattern with a first dielectric layer and replacing the portions of the sacrificial structure above and aligned with the dielectric lines of the grating pattern with a second dielectric layer;
forming one or more via locations in the first dielectric layer, exposing portions of the metal lines of the grating pattern of the previous layer metallization structure;
recessing portions of the first and second dielectric layers; and
forming a plurality of metal lines in the recessed portions of the first and second dielectric layers and metal vias in the one or more via locations, the plurality of metal lines having a second direction, perpendicular to the first direction.

2. The method of claim 1, further comprising:
forming one or more plug locations in the second dielectric layer.

3. The method of claim 1, wherein a metal line of the plurality of metal lines in the recessed portions of the first and second dielectric layers is electrically coupled to a metal line of the previous layer metallization structure by a via having a center directly aligned with a center of the metal line of the previous layer metallization structure and with a center of the metal line of the plurality of metal lines in the recessed portions of the first and second dielectric layers.

4. The method of claim 1, wherein forming the plurality of metal lines and metal vias comprises forming and planarizing a metal layer.

5. The method of claim 1, further comprising:
forming an air-gap structure amongst the plurality of metal lines in the recessed portions of the first and second dielectric layers.

6. The method of claim 1, wherein forming the sacrificial structure above the grating pattern comprises using a directed self-assembly (DSA) technique.

7. The method of claim 6, wherein forming the sacrificial structure comprises forming a 50-50 diblock polystyrene-polymethyl methacrylate (PS-PMMA) copolymer.

8. The method of claim 1, wherein forming the sacrificial structure above the grating pattern comprises using a selective growth technique.

9. The method of claim 1, wherein forming the first dielectric layer and the second dielectric material layer comprises forming a different material.

10. The method of claim 1, wherein forming the first dielectric layer and the second dielectric material layer comprises forming a same material.

11. A method of fabricating an interconnect structure for an integrated circuit, the method comprising:
providing a previous layer metallization structure comprising an alternating metal line and dielectric line grating pattern having a first direction;
forming a polymer structure above the grating pattern, the polymer structure comprising a first polymer species disposed above and aligned with the metal lines of the grating pattern and a second polymer species disposed above and aligned with the dielectric lines of the grating pattern;
removing the first polymer species from the polymer structure;
forming a sacrificial material above and aligned with the metal lines of the grating pattern, and adjacent to the second polymer species;
removing the second polymer species from the polymer structure;
forming a first permanent dielectric layer above and aligned with the dielectric lines of the grating pattern, and adjacent to the sacrificial material;
replacing the sacrificial material with a second permanent dielectric layer, the second permanent dielectric material layer disposed above and aligned with the metal lines of the grating pattern, and adjacent to the first permanent dielectric layer;
forming a plurality of trenches in the first permanent dielectric layer and in the second permanent dielectric layer, the plurality of trenches having a grating pattern having a second direction, perpendicular to the first direction;
forming a dielectric material in the plurality of trenches;
etching one or more via locations in the second permanent dielectric layer, exposing portions of the metal lines of the grating pattern of the previous layer metallization structure;
protecting one or more plug locations by forming a hardmask pattern on portions of the first permanent dielectric layer;
recessing exposed portions of the first and second permanent dielectric layers; and

forming a metal layer in the recessed portions of the first and second permanent dielectric layers.

12. The method of claim 11, further comprising:
forming a hardmask on the first permanent dielectric layer, wherein the hardmask protects the first permanent dielectric layer during the etching of the via locations in the second permanent dielectric layer, and wherein protecting the one or more plug locations by forming the hardmask pattern comprises forming the hardmask pattern from the hardmask.

13. The method of claim 11, further comprising:
removing the dielectric material in the plurality of trenches to form an air-gap structure.

14. The method of claim 11, wherein forming the polymer structure above the grating pattern comprises using a directed self-assembly (DSA) technique.

15. The method of claim 14, wherein forming the polymer structure comprises forming a 50-50 diblock polystyrene-polymethyl methacrylate (PS-PMMA) copolymer.

16. The method of claim 11, wherein forming the polymer structure above the grating pattern comprises using a selective growth technique.

17. The method of claim 11, wherein forming the first permanent dielectric layer and the second permanent dielectric material layer comprises forming a different material.

18. The method of claim 11, wherein forming the first permanent dielectric layer and the second permanent dielectric material layer comprises forming a same material.