CLAIMS

What is claimed is:

1. A method of fabricating a 2-D film substrate, comprising:

creating a subsurface gas source in a substrate;

depositing a catalyst layer on the substrate;

growing a crystalline thin film on the catalyst layer;

coating a polymer layer on the crystalline thin film;

etching the catalyst layer by liquid infiltration and simultaneously contacting the crystalline thin film with the substrate;

cleaning the crystalline thin film and substrate to remove residual etchant used to etch the catalyst layer;

removing moisture from the 2-dimensional crystalline film and the substrate;

and

removing the polymer layer to provide the component.

2. The method of Claim 1, wherein creating of a subsurface gas source comprises pre-treatment of the substrate surface with a plasma of gases or ions.

3. The method of Claim 2, wherein the plasma of gases or ions is plasma of a gas or ion selected from the group consisting of inert gases, nitrogen, oxygen, and hydrogen, or a combination thereof.

4. The method of Claim 2, wherein the subsurface gas source forms a metastable phase in the substrate.

5. The method of Claim 1, wherein the substrate is a dielectric or semiconductor material.

6. The method of Claim 1, wherein the catalyst layer is a metal having a thickness of about 2 to about 5 times greater than the polymer layer.

7. The method of Claim 6, wherein the catalyst layer has a thickness of between about 50 nm to about 1 μm.

8. The method of Claim 1, wherein the crystalline thin film is a 2-D film formed from carbon, boron nitride, or 2-dimensional chalcogenides, or a combination thereof.

9. The method of Claim 1, wherein the etching of the catalyst layer further comprises activating release of gas bubbles from the subsurface gas source.

10. The method of Claim 9, wherein the releasing of gas bubbles from the subsurface gas source forms capillary bridges at the interface of the crystalline thin film and the substrate.

11. The method of Claim 1, wherein the cleaning comprises use of a first solvent to infiltrate the interface between the crystalline thin film and the substrate.

12. The method of Claim 11, wherein the solvent comprises deionized water.

13. The method of Claim 1, wherein removing moisture comprises baking the 2-dimensional crystalline film and the substrate.

14. The method of Claim 1, wherein the removing of the polymer comprises using a second solvent.