

CLAIMS

1. A support for an electron microscopy sample, the support comprising a metallic foil having one or more holes therethrough wherein thickness of the metallic foil is less than 50 nm and/or the mean linear intercept grain size is 50 nm or less, wherein the ratio of the diameter of each hole to the thickness of the metallic foil is 15:1 or less, and wherein the metallic foil consists of either (a) one or more metals selected from transition metals, aluminium and beryllium, or an alloy thereof; or (b) degenerately doped silicon wherein the dopant element is selected from boron, aluminium, boron and arsenic at a concentration of 10^{20} atoms/cm³ or higher.
2. A support according to claim 1 wherein thickness of the metallic foil is less than 50 nm and the mean linear intercept grain size is 50 nm or less.
3. A support according to claim 1 or claim 2 wherein the edge roughness of each hole is 20 nm or less as measured by the root mean square deviation from the expected theoretical hole edge profile.
4. A support according to any one of the preceding claims wherein the diameter of each hole is 750 nm or less.
5. A support according to any one of the preceding claims wherein the support has a light wavelength transmittance maximum of from 650 to 800 nm.
6. A support according to any one of the preceding claims wherein the holes are arranged in a hexagonal array or a square pattern array.
7. A support according to any one of the preceding claims wherein the metallic foil is suspended across holes in an electron microscopy grid.
8. A support according to claim 7 wherein the metallic foil and the grid are integrally formed.
9. A support according to any one of claims 7 and 8 wherein the grid comprises a mesh having a mean hole size that is on a micrometre scale and the mesh holes are tessellating hexagons or tessellating squares.

10. A support according to any one of the preceding claims wherein the metallic foil consists of one or more of gold, palladium and platinum or an alloy thereof, optionally wherein the metallic foil consists of gold or an alloy thereof.
11. A support according to any one of the preceding claims wherein the support consists of one or more of gold, palladium and platinum or an alloy thereof, optionally wherein the support consists of gold or an alloy thereof.
12. Use of the support according to any one of claims 1 to 11 in transmission electron cryo-microscopy.
13. A method of manufacturing a metallic foil for a support according to any one of claims 1 to 11, the method comprising the steps of depositing a metallic layer onto a patterned substrate that is cooled to 200K or less to form a layer having a thickness of 50 nm or less and having one or more holes therethrough; removing the deposited metallic layer; and forming the metallic layer into a support for an electron microscopy sample, wherein the metallic foil consists of either (a) one or more metals selected from transition metals, aluminium and beryllium, or an alloy thereof; or (b) degenerately doped silicon wherein the dopant element is selected from boron, aluminium, boron and arsenic at a concentration of 10^{20} atoms/cm³ or higher.
14. A metallic foil for a support formed by a method according to claim 13.
15. A method of electron microscopy imaging comprising a step of sequentially imaging a sample suspended in a hole of a support according to any one of claims 1 to 11, wherein each image encompass at least a part of the edge of the hole and the electron beam encompasses the hole and the complete edge of the hole.
16. A method of electron microscopy imaging according to claim 15 wherein at least a part of the edge of the hole in each image is compared to the other images to remove any relative shift between sequential images and/or wherein the sequential images of the specimen in the hole are weighted to account for damage to the specimen.