CLAIMS

1. A transparent conductor comprising:

a graphene layer, and

a permanent dipole layer on the graphene layer configured to electrostatically dope the graphene layer, wherein the permanent dipole layer being polarised and which maintains its dipole orientations without any applied electric field, wherein the permanent dipole layer is formed from a material comprising at least one of polar molecules or ions, and wherein the dipoles of the material are aligned to create the polarised permanent dipole layer.

2. The transparent conductor in claim 1 wherein the permanent dipole layer is a substantially polarised ferroelectric layer, substantially transparent, and/or a self assembling molecule layer.

3. The transparent conductor in claim 1 ~~or 2~~ wherein the graphene layer is a single layer graphene, bilayer graphene or few layer graphene.

4. The transparent conductor in ~~any preceding~~ claim 1 further comprising an ultrathin layer of Hexagonal Boron Nitride or Mica.

~~5. The transparent conductor in any preceding claim wherein the permanent dipole layer is substantially transparent.~~

65. The transparent conductor in claim ~~5~~2 wherein the transmittance is between

90-98 %.

~~7~~6. The transparent conductor in ~~any preceding~~ claim 1 wherein the Young's modulus is between 4 Gpa and 1Tpa.

~~8~~7. The transparent conductor in ~~any preceding~~ claim 1 wherein the transparent conductor is wafer scale or large scale.

~~9~~8. The transparent conductor in claim ~~8~~7 where the wafer scale or large scale transparent conductor is between 1 mm^2 to 10 m^2 in area.

~~10~~9. The transparent conductor in ~~any preceding~~ claim 1 wherein the sheet resistance is less than 125 Ω/□ at transparency of >97%, or substantially 10 Ω/□ at transparency of >90%.

~~11. The transparent conductor in claim 10 wherein the sheet resistance is substantially 10 Ω/□ at transparency of >90%.~~

~~12. The transparent conductor in claim 1 wherein the permanent dipole layer is a self assembling molecule layer.~~

~~13. The transparent conductor in any preceding claim wherein the permanent dipole layer is substantially polarised and substantially maintains its dipole orientations without any substantial applied electric field.~~

~~14~~10. The transparent conductor in ~~any preceding~~ claim 1 which is substantially flexible.

~~15~~11. The transparent conductor in claim ~~14~~10 wherein the flexibility comprises that the original resistance state can be recovered after 20 % tensile strain or 6 % stretching force.

~~16~~12. The transparent conductor in ~~any one of~~ claims 1 ~~to 13~~ which is substantially non-flexible.

~~17~~13. A solar cell, organic light emitting diode, touch panel or display comprising a transparent conductor according to ~~any preceding~~ claim 1 configured as an electrode and/or a diffusion barrier.

~~18~~14. A method of fabricating a transparent conductor comprising

forming a wafer or sheet of graphene, ~~and~~

electrostatically doping the graphene with a layer of permanent dipoles, the layer being a layer of polarisable material, and

polarising the layer of polarising material such that the layer of polarisable material maintains its dipole orientations without any applied electric field.

~~19. The method in claim 18 wherein doping comprises forming a layer of polarisable material onto the graphene wafer.~~

~~20. The method in claim 19 further comprising substantially polarising the layer of polarisable material.~~

~~21~~15. The method in claim ~~20~~14 wherein the polarising comprises applying a voltage pulse to, or corona polling, the polarisable material.

~~22~~16. The method in claim ~~18~~14 wherein doping comprising forming a layer of self-assembled molecules (SAM) on the graphene layer.

~~23~~17. The method in ~~any one of~~ claims ~~18 to 22~~14 further comprising forming the graphene by CVD on copper, epitaxial growth or chemically modifying graphene.

~~24~~18. The method in ~~any one of~~ claims ~~18 to 23~~14 in a roll to roll process.