CLAIMS

1. A method of forming a perpendicular magnetic recording medium, the perpendicular magnetic recording medium comprising a substrate, an underlayer on the substrate, an intermediate layer on the underlayer and a recording layer on the intermediate layer, the underlayer comprising a first soft underlayer, an antiferromagnetically coupled Ru layer on the first soft underlayer, a second soft underlayer on the antiferromagnetically coupled Ru layer, and an orientation control layer on the second soft underlayer, the method comprising applying a negative bias voltage to the substrate during formation of the underlayer, wherein the negative bias voltage is applied to the substrate during formation of one of: the first soft underlayer and the second soft underlayer, and further comprising removing the negative bias voltage during formation of a portion of the one of: the first soft underlayer and the second soft underlayer adjacent the antiferromagnetically coupled Ru layer.

2. The method of claim 1, wherein the negative bias voltage is applied to the substrate during formation of at least one of: the first soft underlayer, the second soft underlayer and the orientation control layer.

~~3. The method of claim 1 or claim 2, wherein the negative bias voltage is applied to the substrate during formation of the first soft underlayer, and further comprising removing the negative bias voltage during formation of a portion of the first soft underlayer adjacent the antiferromagnetically coupled Ru layer.~~

~~4. The method of claim 3, wherein the portion of the first soft underlayer adjacent the antiferromagnetically coupled Ru layer has a thickness of up to 10% of the thickness of the first soft underlayer.~~

~~5. The method of any one of the preceding claims, wherein the negative bias voltage is applied to the substrate during formation of the second soft underlayer, and further comprising removing the negative bias voltage during formation of a portion of the second soft underlayer adjacent the antiferromagnetically coupled Ru layer.~~

~~6.~~3. The method of claim ~~5~~1, wherein the portion of the one of : the first soft underlayer and the second soft underlayer adjacent the antiferromagnetically coupled Ru layer has a

thickness of up to 10% of the thickness of the one of: the first soft underlayer and the second soft underlayer.

7.4. The method of any one of the preceding claimsclaim 1, wherein the orientation control layer comprises a first sub-layer and a second sub-layer, and the negative bias voltage is applied to the substrate during formation of at least one of the first sub-layer and the second sub-layer.

8.5. The method of any one of the preceding claimsclaim 1, wherein the negative bias voltage applied is up to 500V.

9. A perpendicular magnetic recording medium fabricated by the The method of any one of the preceding claims.

10. The perpendicular magnetic recording medium of claim 9claim 1, wherein the orientation control layer has a face-centred cubic structure.

11. The perpendicular magnetic recording medium of claim 9 or claim 10, wherein the orientation control layer comprises a first sub-layer and a second sub-layer.

12. The perpendicular magnetic recording medium of claim 11, wherein the first sub-layer has an amorphous structure and the second sub-layer has a face-centred cubic structure.

6. The method of claim 1, wherein each of the first soft underlayer and the second soft underlayer are directly adjacent the antiferromagnetically coupled Ru layer.