10. The method of any one of Claims 1 to 9, where the culture media is osteogenic media.

11. The method of any one of the Claims 1 to 10, where the accelerated differentiation is osteogenic differentiation.

12. The method of any one of the claims 1 to 11, where the differentiated cell is an osteoblast.

13. The method of any one of the claims 1 to 12, where the supporting substrate is a biocompatible material.

14. A method of repairing and improving bone tissue function comprising directing stem cell differentiation by placing the stem cells on graphene in the absence of growth factors or external stimulation and transplanting the differentiated stem cells in the tissue at the site of repair.

15. The method of Claim 14, where the stem cell is a mesenchymal stem cell.

16. The method of any one of Claims 14 and 15, where the culture media is osteogenic media.

~~17. A composition for accelerating differentiation of stem cells comprising~~ graphene on an implantable, biocompatible scaffold for support of tissue growth.

18. The composition of Claim 17, where the stem cell is a mesenchymal stem ~~cell.~~

~~19. The composition of any one of Claims 17 and 18, where the culture media is osteogenic media.~~

~~20. Use of graphene as a substrate for stem cell differentiation.~~