Claims

[Claim 1] A method of producing an osteoinductive bone regeneration material comprising a targetable bone morphogenetic protein-2 (tBMP-2), comprising:
preparing a fibrous scaffold material formed of a plurality of electrospun biodegradable fibers, wherein
the plurality of electrospun biodegradable fibers entangle with each other to form a cotton-wool like structure having inter-fiber spaces forming a microenvironment for cell growth therein,
the electrospun biodegradable fibers comprise 43-60 vol% β-TCP particles distributed in the electrospun biodegradable fibers such that a portion of the β-TCP particles is partially exposed on a surface of the electrospun biodegradable fibers without being coated by a polymer layer, and
contacting the fibrous scaffold material with tBMP-2 contained in an acetate buffer solution so that the tBMP-2 is bound to the β-TCP particles exposed on the surface of the fibers forming the microenvironment throughout the cotton-wool like structure to produce the osteoinductive bone graft,
wherein an area of binding site for tBMP-2 on β-TCP particles exposed on a surface of the electrospun biodegradable fibers is adjusted by an amount of the β-TCP particles contained in the electrospun biodegradable fibers.

[Claim 2] The method of claim 1, wherein diameters of the plurality of electrospun biodegradable fibers are 40-320 μm.

[Claim 3] The method of claim 1 or 2, wherein lengths of the plurality of electrospun biodegradable fibers are 5-20 mm.

[Claim 4] The method of any one of the preceding claims, wherein the plurality of electrospun biodegradable fibers comprise PLGA

[Claim 5] The method of any one of the preceding claims, wherein diameters of the β-TCP particles are 2-5 μm.

[Claim 6] The method of any one of the above claims, wherein the tBMP-2 comprises a β-TCP binding peptide fused to BMP-2, the β-TCP binding peptide has the amino acid sequence selected from the group consisting of LLADTTHHRPWT (SEQ ID NO: 1), GQVLPTTTPSSP (SEQ ID NO: 2), VPQHPYPVPSHK (SEQ ID NO: 3), HNMAPATLHPLP (SEQ ID NO: 4), QSFASLTNPRVL (SEQ ID NO: 5), HTTPTTTYAAPP (SEQ ID NO: 6), QYGVVSHLTHTP (SEQ ID NO: 7), TMSNPITSLISV (SEQ ID NO: 8), IGRISTHAPLHP (SEQ ID NO: 9), MNDPSPWLRSPR (SEQ ID NO: 10), QSLGSMFQEGHR (SEQ ID NO: 11), KPLFTRYGDVAI (SEQ ID NO: 12), MPFGARILSLPN (SEQ ID NO: 13), QLQLSNSMSSLS (SEQ ID NO: 14), TMNMPAKIFAAM (SEQ ID NO: 15), EPTKEYTTSYHR (SEQ ID NO: 16), DLNELYLRSLRA (SEQ ID NO: 17), DYDSTHGAVFRL (SEQ ID NO: 18), SKHERYPQSPEM (SEQ ID NO: 19), HTHSSDGSLLGN (SEQ ID NO: 20), NYDSMSEPRSHG (SEQ ID NO: 21), and ANPIISVQTAMD (SEQ ID NO: 22). VIGESTHHRPWS (SEQ ID NO: 23), IIGESSHHKPFT (SEQ ID NO: 24), GLGDTTHHRPWG (SEQ ID NO: 25), and ILAESTHHKPWT (SEQ ID NO: 26).