CLAIM

1. An osteoinductive bone regeneration material comprising a targetable bone morphogenetic protein-2 (tBMP-2) and a cotton-wool like structure formed of a plurality of electrospun biodegradable fibers,

   wherein the electrospun biodegradable fibers have a diameter of 10-100 μm such that the bone regeneration material has a sufficient mechanical strength and a space between the electrospun biodegradable fibers for permeation of body fluid through the bone regeneration material,

   wherein the electrospun biodegradable fibers contains 25-65 vol% of β-TCP particles, wherein the diameter of the β-TCP particles is 1-5 μm, such that a portion of the β-TCP particles is exposed on a surface of the electrospun biodegradable fibers and the remaining portion of the β-TCP particles is buried in the electrospun biodegradable fibers, and

   wherein tBMP-2 is bound to the β-TCP particles that are exposed on the surface of the electrospun biodegradable fibers by contacting the electrospun biodegradable fibers with tBMP-2 contained in an acetate buffer solution,

   upon implanting the osteoinductive bone regeneration material in a bone defect site of a patient, body fluid containing mesenchymal stem cells permeates between the electrospun biodegradable fibers and contacts with the tBMP-2 so that bone formation is induced at the bone defect site.

2. The osteoinductive bone regeneration material of claim 1, wherein the calcium compound particles comprise β-TCP particles, or silicon-doped vaterite (SiV) particles, or a combination of β-TCP particles and SiV particles.
3. The osteoinductive bone regeneration material of claim 1, wherein the BMP-2 is a recombinant BMP-2 or a targetable BMP-2.
4. The osteoinductive bone regeneration material of claim 3, wherein the recombinant BMP-2 is a recombinant human BMP-2 (rhBMP-2).
5. The osteoinductive bone regeneration material of claim 3, wherein the targetable BMP-2 comprises a β-TCP binding peptide fused to BMP-2.
6. The osteoinductive bone regeneration material of claim 5, wherein 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).

7. The osteoinductive bone regeneration material of claim 1, wherein the electrospun biodegradable fiber contains 40-60 vol% of calcium compound particles.
8. The osteoinductive bone regeneration material of claim 1, wherein the biodegradable polymer is poly(lactic-co-glycolic acid) (PLGA).