CLAIMS:

1. A platelet-rich plasma (PRP) composition for treatment of osteoarthritis, comprising:
   a core comprising platelet-rich plasma (PRP) and an activator compound comprising calcium chloride, wherein bioactive molecules are released in the core upon activation of alpha granules of platelets in the plasma by means of simultaneous photochromatic light and pulsed electric field at sub-microsecond duration low electric field (SMLEF); and
   an alginate-based wall surrounding the core to prevent haemolysis.

2. The composition according to claim 1, wherein the core comprises PRP and the activator compound in a weight ratio between 80 to 90: 10 to 20.

3. The composition according to claim 1 or 2, wherein the alginate-based wall is formed from an alginate solution having a volumetric concentration of 2.5 % to 10 % of alginate in water.

4. The composition according to any one of claims 1 to 3 has platelet count of at least 1,000,000/μL of plasma.

5. A method of producing a platelet-rich plasma (PRP) composition for osteoarthritis treatment, the method comprising the steps of:
   separating whole blood to obtain a platelet-rich plasma (PRP);
   activating the platelet-rich plasma (PRP) to stimulate release of bioactive molecules from alpha granules of the platelets in the platelet-rich plasma (PRP) in the presence of simultaneous photochromatic light and pulsed electric field at sub-microsecond duration low electric field (SMLEF);
   enriching the activated platelet-rich plasma (PRP) by adding an activator compound to further stimulate release of bioactive molecules from the platelets; and
   encapsulating the enriched platelet-rich plasma (PRP) in alginate nanoparticles.

6. The method according to claim 5, wherein the activating step is conducted with the photochromatic light at near infrared wavelength between 600 nm to 1200 nm.

7. The method according to claim 5 or 6, wherein the activating step is conducted by subjecting the PRP to exposure under the photochromatic light at a predetermined distance and duration.

8. The method according to any one of claims 5 to 7, wherein the step of separating the whole blood is conducted by horizontally centrifugating thereof.

9. The method according to claim 8, wherein the centrifugation is conducted at about 1200 to 1600 rpm.

10. The method according to any one of claims 5 to 9, wherein the step of encapsulating the enriched PRP in alginate nanoparticles is conducted by adding the enriched PRP into an alginate solution in the presence of stirring.