Supporting Information:

**Dynamically tunable polymer microwells for directing mesenchymal stem cells differentiation**

Tao Gong, Liuxuan Lu, Xian Liu, Dian Liu, Kun Zhao, Yuping Chen, Shaobing Zhou*

**Scheme S1.** Schematic representation of shape fixing processes. The surface microwells on c-6A PEGPCL substrate were stretched 100% and deformed at 45 °C with a tensile stress of 0.5 MPa, and cooled to 0 °C to fix the deformed shape.

**Figure S1.** In vitro degradation of c-6A PEG-PCL meshes in PBS (pH 7.4) at 37°C. Here, represent the curves of mass residual percent and molecular weight (Mw), respectively.
Figure S2. Mechanical properties of c-6 A PEG-PCL: a) and b) represent the Stress-strain curve and the Young’s modulus.

Figure S3. (A) and (B) Relative gene level expression analyses of osteogenic (RUNX2, OCN and OPN), and adipogenesis (PPARγ, LEPTIN, and GPDH) markers, and the MSCs cultured on tissue culture polystyrene with traditional induction media (Adipogenic induction and Osteoblasts induction).
**Figure S4.** Cell viability (%) of rBMSCs on static surface (static-T, static-S, static-H, and static-C) and dynamic surfaces including dynamic-T, dynamic-S, dynamic-H, and dynamic-C surfaces after 6 d culture.

**Figure S5.** The data of CCK8 for MSCs cultured on the different microwells at days 2, 4 and 6 post seeding, respectively.
Figure S6. The cell viability (%) (A) and (B) Fluorescence images of rBMSCs stained with calcein AM for MSCs cultured on the tissue culture polystyrene for different culture temperatures at days 2, 4 and 6 post seeding, respectively.
Figure S7. Dynamic tunable geometric patches implanted in the rabbit mandibular bone defect.