



**Figure S1.** Bone Resorption Volume Calculation. [A] Micro-computed tomography ( $\mu$ CT) renderings are [B] filled with bubbles within the defect. [C] 3D rendering of initial bubbles, at an intermediate degree of expanding, and at the final point where bubbles have contacted adjacent subchondral bone. [D] The 3D rendered volume is transected at the original cartilage bone interface to obtain a bone resorption volume.