Supplementary Information for

Parallelized Monte Carlo photon transport simulations for arbitrary multi-angle wide-field illumination in optoacoustic imaging

Tong Lu, Jiao Li*, Tingting Chen, Shichao Miao, Shuai Li, Xinyang Xu, Feng Gao

* Corresponding to: jiaoli@tju.edu.cn

The simulation of focused light illumination is shown in **Figure S1**. The light with the center located at (30,30,0) mm has a diameter of 10 mm, and its focus point is located at (30,30,8.66) mm. In the MCX method, 1000 pencil beam sources (10^8 photons for each beam, 10^{11} photons in total) with different initial angles are set at the assigned positions in the illumination surface, in order to simulate the focused light illumination. The proposed MCOAI method only emits 10^8 photons in total. The initial positions of 10^8 photons are randomly generated by the random numbers in the illumination surface, and then each initial angle can be determined by each initial position. The enlarged view in **Figure S1** shows that the MCOAI result near the source is much smoother than the MCX result, although the number of photons in the MCOAI method is much less than that in the MCX method. The comparison results in **Figure S1** are consistent with the results in **Figure 3**.

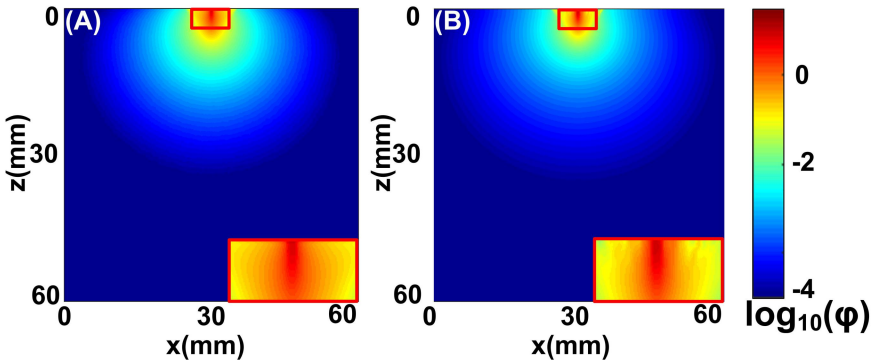

Figure S1 Comparison results of the MCOAI and MCX methods with the focused light illumination to Sample 1: the fluence map along the plane of y = 30 mm from **(A)** the MCOAI result and **(B)** the MCX result. The enlarged views are displayed in the red rectangular regions.