Supporting Information

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SI Text

Identifying the Infected RBCs. To identify *Plasmodium falciparum* infected RBCs, we used both bright-field and fluorescence microscopy (Fig. S1). Fig. S1 *A–D* show bright-field images of healthy RBC, ring stage, trophozoite, and schizont. To distinguish schizont from trophozoite stages, we used the DAPI staining and fluorescent microscopy as in Fig. S1 *E* and *F*.

Masking the Parasite. Because *P. falciparum* parasites have a different refractive index from the RBC hemoglobin solution, the movement of *P. falciparum* could cause artifacts in quantifying the motion of RBC membrane. To minimize this effect, we used the masks for the region where the parasite is located and excluded those areas from the calculation of the mean squared displacements for analyzing the membrane dynamics. The procedure to generate the masks is illustrated in Fig. S2. First, we identified the shape and size of a RBC by using bright-field microscopy (Fig. S2*A*) and made a mask for the outer shape of the cell (Fig. S2*B*). Fluorescent microscopy provided the information about the location of *P. falciparum* parasite (Fig. S2*C*). From this information we generated the mask for the parasite. By subtracting the mask for the parasite (Fig. S2*D*) from the mask for the RBC, we were able to identify the mask for the parasite-free region (Fig. S2*E*). Additional smooth filters were used to minimize the artifacts coming from the shape edge.

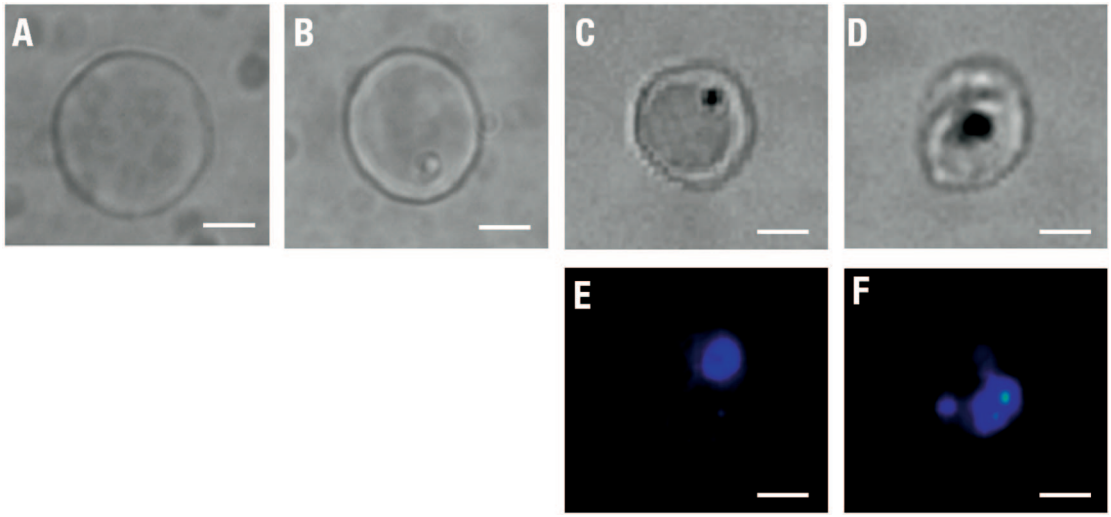


Fig. S1. Identifying the infected RBCs by fluorescence. (*A–D*) Bright-field images. (*E* and *F*) DAPI stained fluorescent images. (*A*) Healthy RBC, (*B*) ring stage, (*C* and *E*) trophozoite stage, and (*D* and *F*) Schizont stage. (Scale bar, 1.5 μm.)

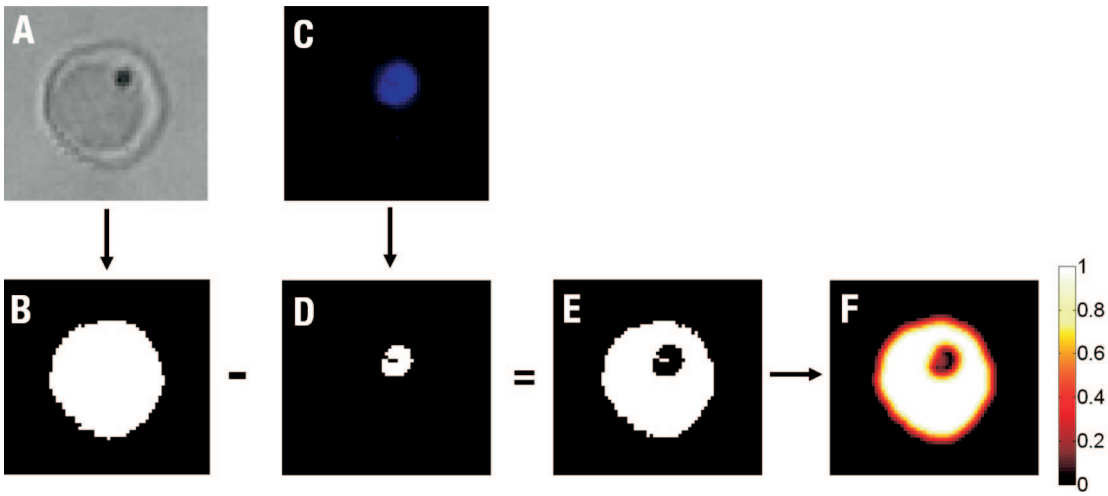
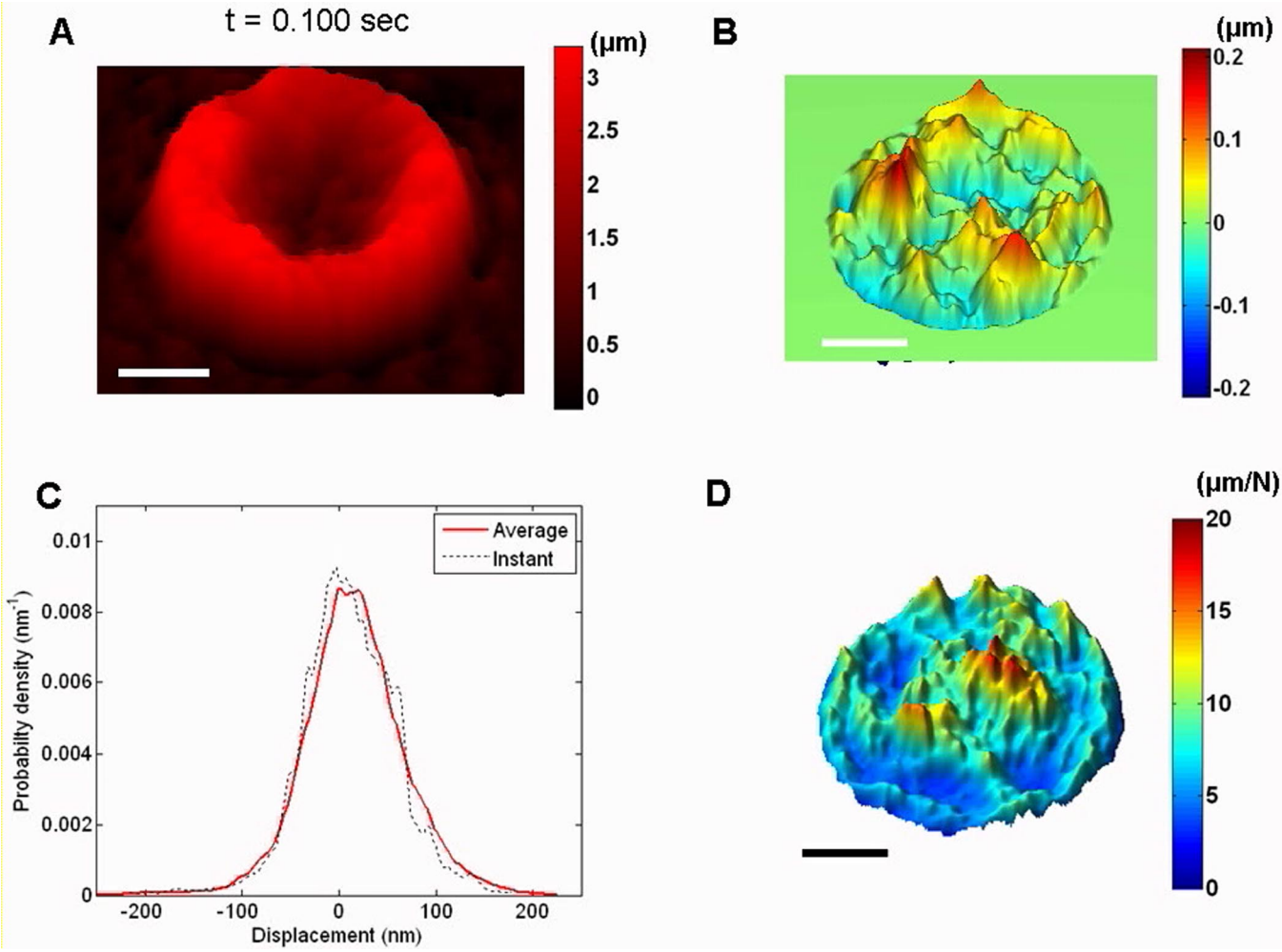
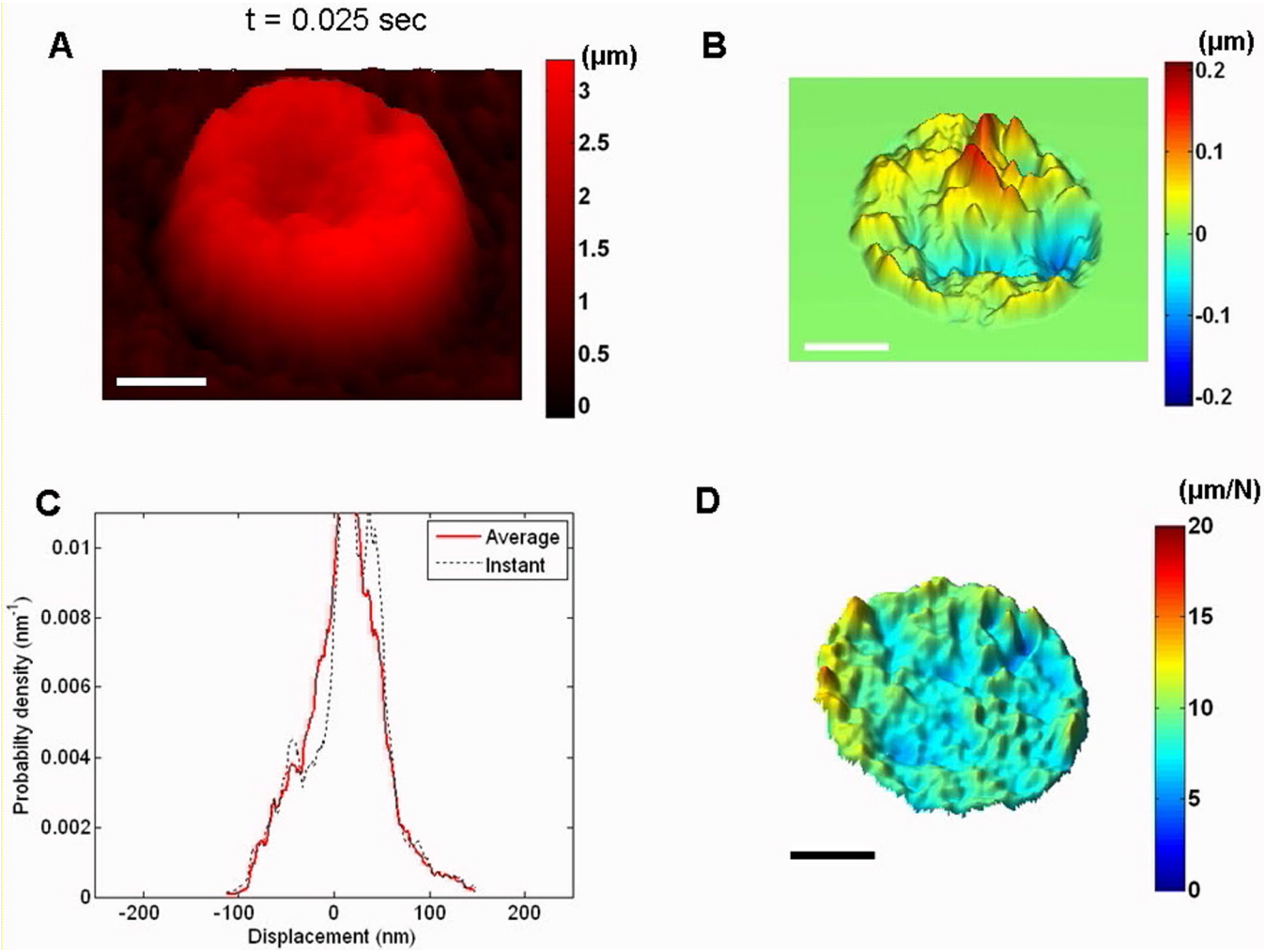


Fig. S2. Masking the parasite in the PDM image. (*A*) Bright-field image. (*B*) Mask from the bright-field image. (*C*) Fluorescent image. (*D*) Mask from the fluorescent image. (*E*) Subtraction of *D* from *B*. (*F*) Mask after smooth filter was applied on *E*.



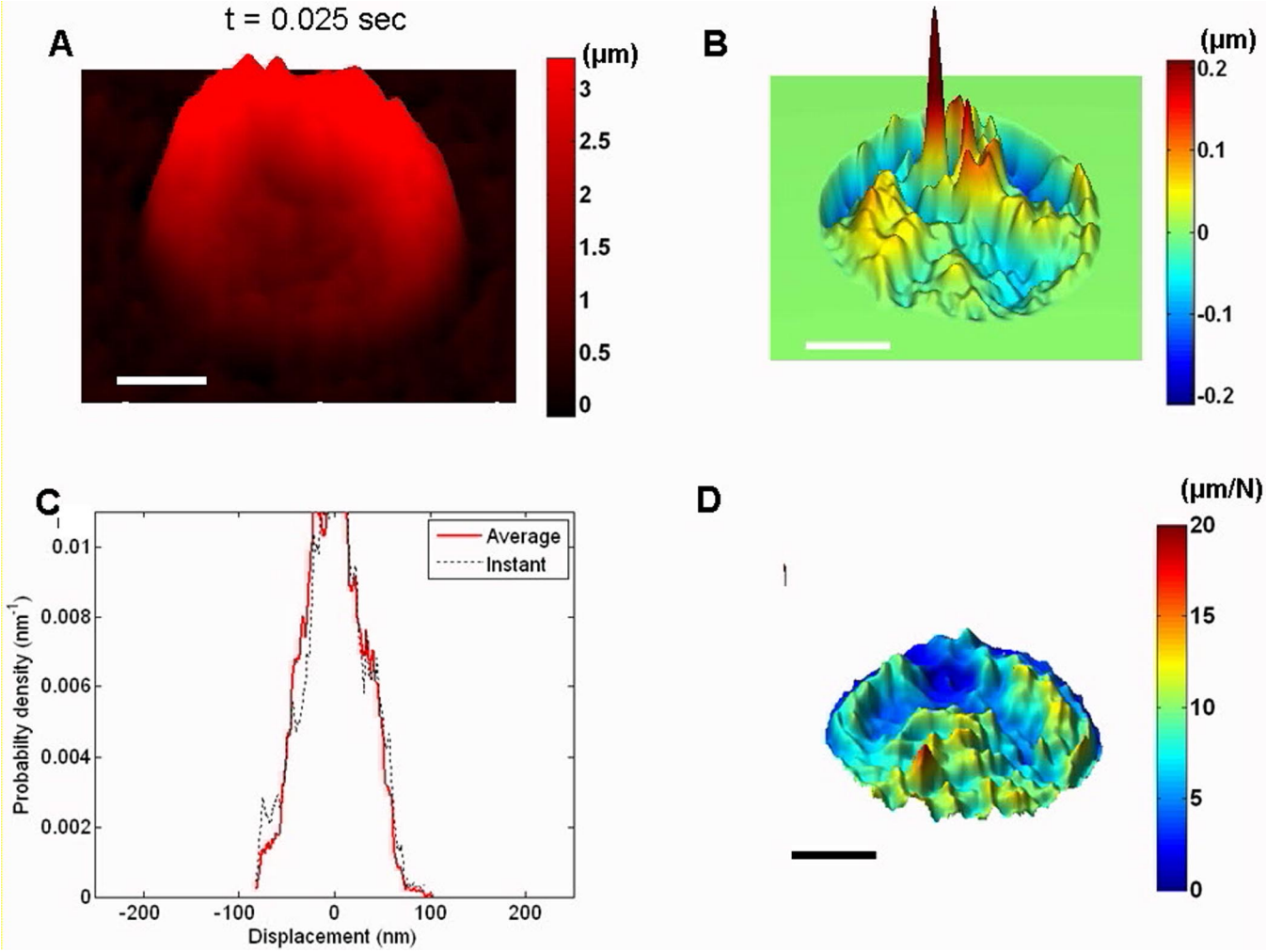
Movie S1. Movie clip of membrane fluctuations of the healthy RBC. (*A*) Topographic information measured by DPM. (*B*) Displacement subtracted from every consequence frame. (*C*) Histogram of displacement. (*D*) Effective spring constant k_e.

Movie S1 (AVI)



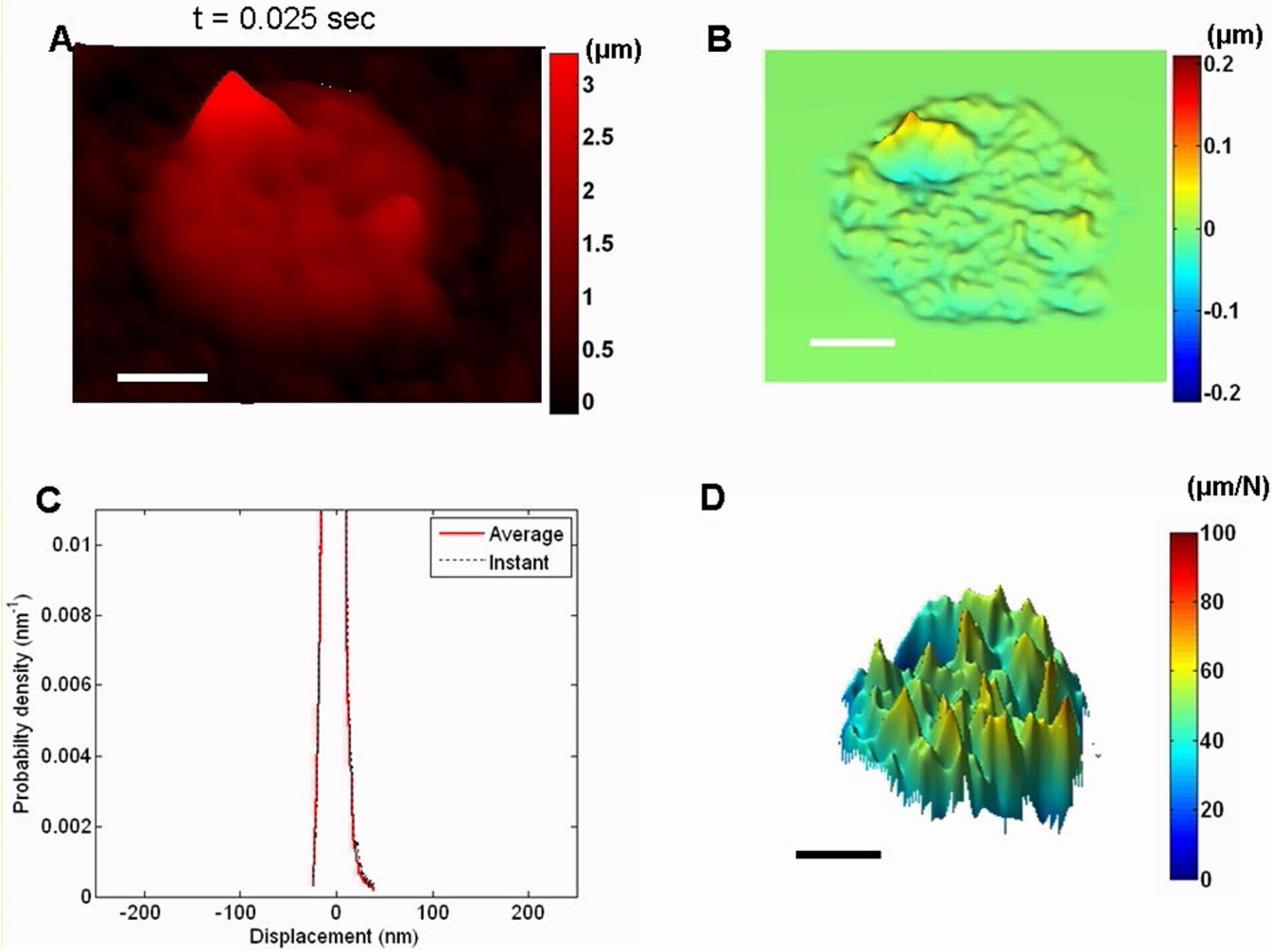
Movie S2. Movie clip of membrane fluctuations of the ring stage of parasitization. (*A*) Topographic information measured by DPM. (*B*) Displacement subtracted from every consequence frame. (*C*) Histogram of displacement. (*D*) Effective spring constant k_e.

Movie S2 (AVI)



Movie S3. Movie clip of membrane fluctuations of the trophozoite stage of parasitization. (*A*) Topographic information measured by DPM. (*B*) Displacement subtracted from every consequence frame. (*C*) Histogram of displacement. (*D*) Effective spring constant k_e.

Movie S3 (AVI)



Movie S4. Movie clip of membrane fluctuations of the schizont stage of parasitization. (*A*) Topographic information measured by DPM. (*B*) Displacement subtracted from every consequence frame. (*C*) Histogram of displacement. (*D*) Effective spring constant k_e.

Movie S4 (AVI)