Electronic Supplementary Information (ESI)

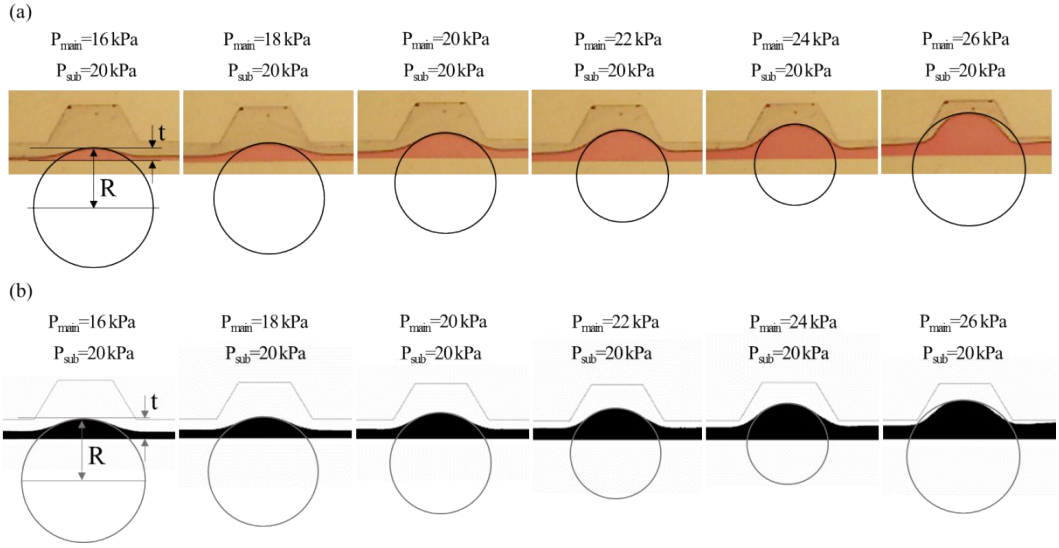

Fig. S1 Fitting of circles to the microlens interface obtained from (a) experiment and (b) simulation. Definitions of the radius of curvature (R) and the lens thickness (t) are also illustrated. The curvature has a maximum value when P_{main} is 24 kPa for both experimental and simulation results. Since the experimentally obtained lens surface is aspherical, the circles are primarily fitted to the apex of the lens. On the other hand, the numerically obtained lens surface is spherical in the region, and thus the circles fit well to the lens surface. The tendency of aspherical shape becomes strong, especially at low inlet pressure. Therefore, relatively large discrepancies are found in the pressure conditions.

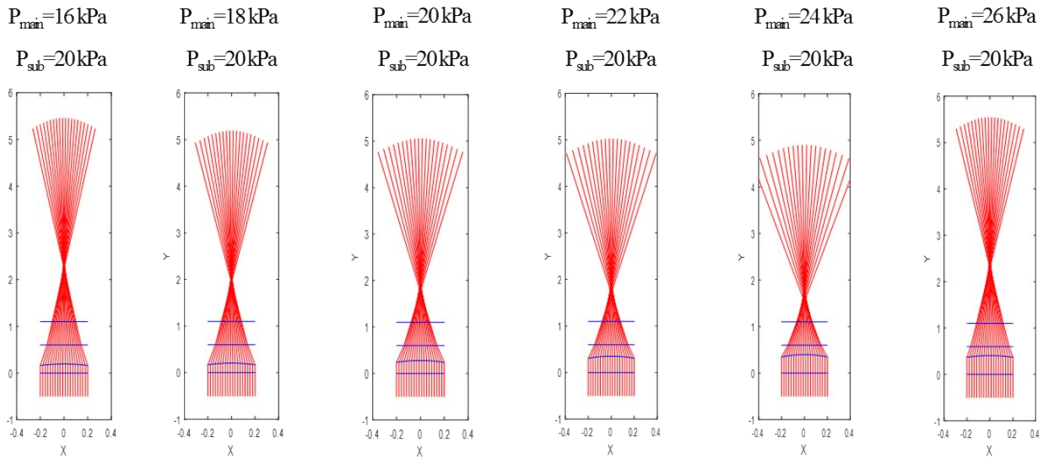

Fig. S2 Predicted ray-path at different pressure values. The first, second, third, and fourth blue lines from bottom to top indicate the bottom of the microlens, the surface of the microlens, the interface between the expansion chamber and PDMS, and the interface between PDMS and the ray-tracing chamber, respectively.

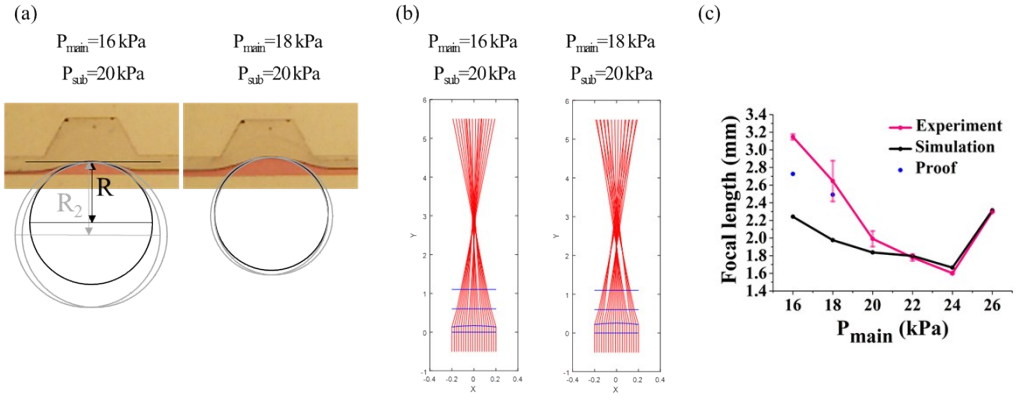

Fig. S3 Evidence for the aspherical microlens effect on the discrepancy in the case of the focal length between the experimental and simulation results. (a) Fitting of circles to the microlens interface obtained from experiment. Additional circles which have different curvature ($1/R_2$) from that of the original fitting circle (R) are added to show that the interface is aspherical. (b) Predicted ray-path from the fitting circles of Fig. S3(a) (one original and two additional circles) at each pressure value. The discontinuity in the ray-path is due to the non-smooth lens interface at the junction of the fitting circles. (c) Focal lengths as a function of the pressure of mainstream. The focal lengths predicted from Fig. S3(b) are plotted with blue dot marker, which are closer to the experimental results. This result proves that the discrepancy observed at lower inlet pressure was due to the aspherical microlens shape.