## Supplementary Materials

Low Reynolds number condition:

Due to the small dimension of the microinjection pipette, the model assumes the flow inside the microinjection pipette is laminar without turbulence with a low Reynolds number. In literature, the critical value for low Reynolds number is generally accepted as smaller than 3500. Thus, we have

$$\mathrm{Re} = \frac{2Q}{v\pi R_0} < 3500$$

where Re is the Reynolds number, Q is the flow rate, $v$ is the kinematic viscosity of the material (for water, 1.004 $m^2/s$), $R_0$ is the inner radius of the injection pipette (150 nm). Calculation shows that the flow rate Q needs to be smaller than $8.27 \times 10^{-4}$ $m^3/s$ to meet the requirement of low Reynolds number. Using an injection pressure of less than 10 kPa and inner radius of the injection pipette less than 1000 nm, the resulting flow rate is in the scale of $10^{-8}$ $m^3/s$, which is significant smaller than $8.27 \times 10^{-4}$ $m^3/s$. Therefore, the model is valid for most conditions of cell microinjection, namely, using an injection pipette with an inner radius less than 1 µm, and an injection pressure less than 10 kPa.

Supplementary Figure:

Figure S1. After microinjection in both RT4 cells (a) and T24 cells (b), deposited dye was contained completely within the cell, and no dye/signal was found outside the cell near the micropipette penetration site.