Electronic Supplementary Information

Table 1. Parameters used in the simulations

Parameter	Value	Meaning	Comments
R	10 μm	cell radius	Measured average value for MDA-MB-231 and BT-20 cell lines
γ	5.7…22.8 Hz	shear rate	Simulated shear rate at cell center when rolling on a surface (flow rate dependent)
T_a	293 K	ambient temperature	Experimental room temperature
η	1mPa·s	dynamic viscosity	1×CMF-PBS medium
$\Delta\rho$	34 kg/m^3	density difference	Estimated based on measured terminal velocity of cell sedimentation
k_{on}	0.0137 Hz	on rate	*Ref.* [33]
k_0	3×10^{-4} Hz	unstressed off rate	*Ref.* [40]
x_c	2e-11 m	reactive compliance	*Ref.* [12]
D	0.05…5 μm	Ligand-ligand distance	0.05μm corresponds to the antibody concentration of 100μg/ml, consistent with *Ref.* [13, 18, 39]
N_R	2×10^6… 2×10^{10}/cm^2	receptor density	EpCAM receptor density
r_0	h+50 nm	capture radius	*Ref.* [12]
Δt	0.004…0.02s	time step	
h	490nm	cell-surface gap	determined by fitting with experimental data
K	850nN/m	bond spring constant	determined by fitting with experimental data