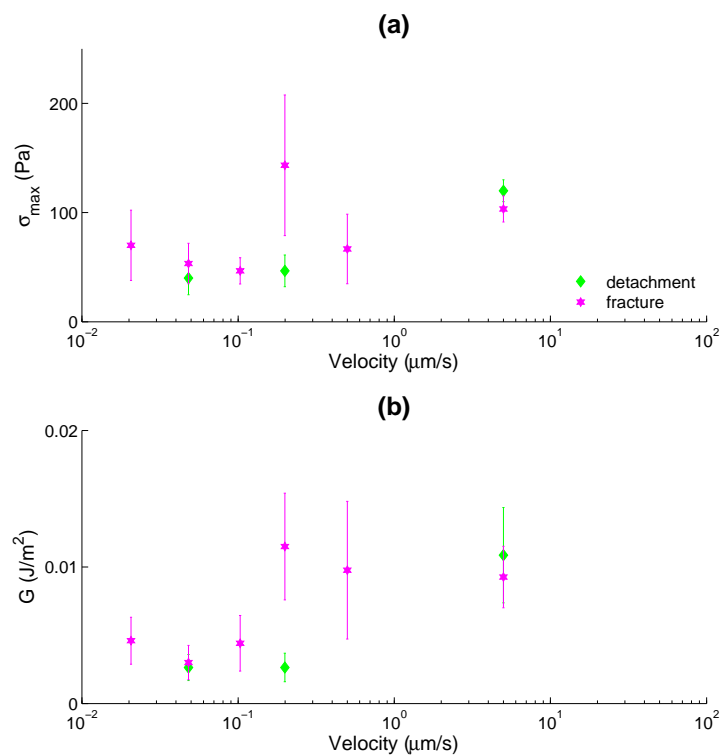


**Supplementary Figure S1** Experimental results for two detachment experiments with contact time  $t_c = 60$  min and pulling speeds  $v = 50 \mu\text{m/s}$  (a-c) or  $v = 0.02 \mu\text{m/s}$  (d-f). Data points are acquired every 0.2 s or every 30 s, respectively for the high and low pulling speeds. **(a, d)** Time evolution of the pulling stress  $\sigma$  deduced from the deflection of the cantilever. Fracture occurs at  $t_{\text{end}} = 2.8$  s or  $t_{\text{end}} = 5800$  s, respectively. **(b, e)** Time evolution of the aggregate strain  $\epsilon$  obtained from the experimental images. **(c, f)** Experimentally deduced stress-strain relationships.



**Supplementary Figure S2** Maximum stress at detachment or fracture and (b) deadhesion energy density as a function of the pulling speed  $v$  for a fixed contact time  $t_c=60$  min using aggregates of the E48 cell line. Green diamonds: detachment experiments with the E48 cell line (number of experiments, from lower to higher  $v$ :  $N = 3, 3, 3$ ); magenta hexagrams: fracture experiments with the E48 cell line ( $N = 3, 3, 3$ ). The error bars correspond to standard errors.