Supporting Information

Capillary-Induced Crack Healing Between Surfaces of Nanoscale Roughness

Emrecan Soylemez and Maarten P. de Boer*

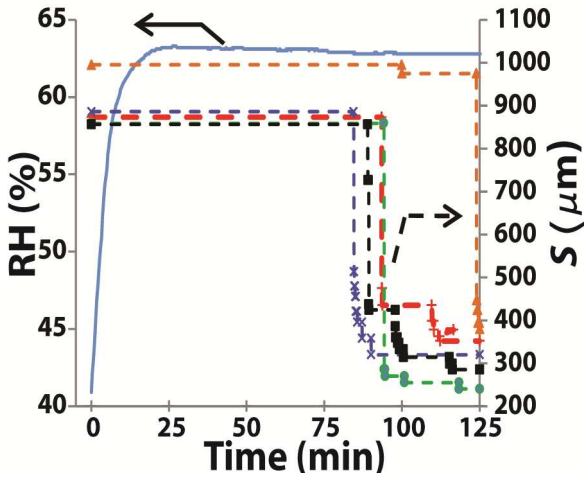

Figure S1. Crack length s versus time on five different cantilevers taken at 5 s intervals after increasing RH from 0 to 62%. The solid line indicates RH at the chamber entry, while dashed lines represent crack length s data for different individual microcantilevers. In this particular experimental trial, the exit line reached steady state at 27 min (not shown), and the environment temperature was 21°C, which is 3°C less than the conditions for the 1 min resolution experiments shown in the main text. These differences may explain the longer period before crack healing begins. In any case, the crack healing velocity is only calculated after previous healing had already been observed, as explained in the main text. The plot clearly shows that crack healing occurs in discrete steps.

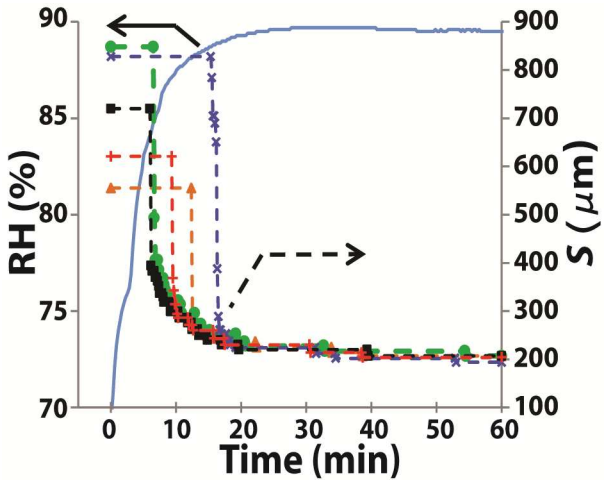

Figure S2. Crack length s versus time on five different cantilevers taken at 10 s intervals after increasing RH from 69 to 89.5%. The solid line indicates RH at the chamber entry, while dashed lines represent crack length s data for different individual microcantilevers. The plot again shows that crack healing occurs in discrete steps.

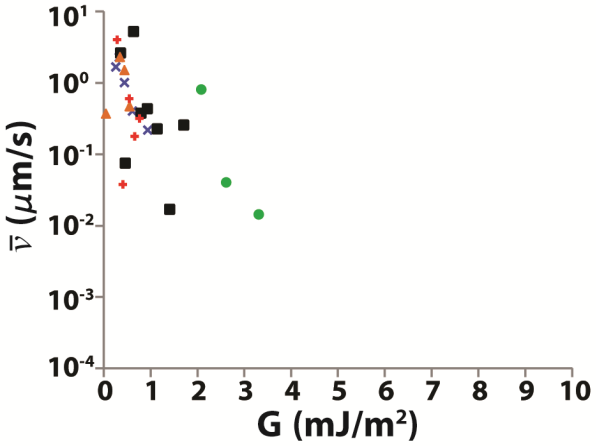

Figure S3. Average crack healing velocity $\bar{v}$ as a function of energy release rate G. Different cantilever responses are plotted with colors and marker types corresponding to Figure S1. In this case, a non zero $\bar{v}$ extends out nearly to G=4 mJ/m^2, possibly indicating a smaller surface roughness.

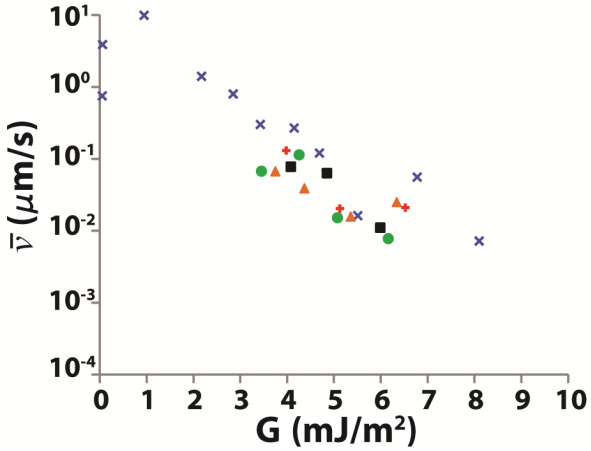

Figure S4. Average crack healing velocity $\bar{v}$ as a function of energy release rate G. Different cantilever responses are plotted with colors and marker types corresponding to Figure S2.

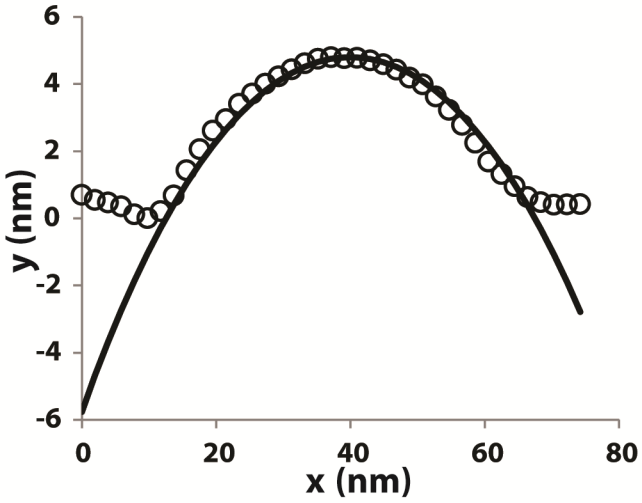

Figure S5. Circle data points represent the AFM topography data across the asperity. Solid line is a curve fit by using a circular arc shape assumption. R=81.3 nm for this given data. As stated in the main text, the average value of R is 124 nm and the standard deviation is 43 nm.