

Supporting Information

Enhancement of steel sandwich sheet adhesion using mechanical interlocking structures formed by electrochemical etching

Seonghyeon Kim^{1, +}, Aeree Kim^{1, +}, Dongwoo Yoo¹, Hye-Jin Yoo², Suk-Kyu Lee²,

Joonwon Kim^{1, *}

¹Department of Mechanical Engineering, Pohang University of Science and Technology (POSTECH), 77 Cheongam-Ro, Nam-Gu, Pohang, Gyeongbuk, Korea 37673

²POSCO Technical Research Laboratories, Automotive Steel Surface Research Group, Gwangyang 57807, Jeollanamdo, Korea

⁺These authors contributed equally as co-first authors to this work.

^{*}Corresponding author. E-mail: joonwon@postech.ac.kr

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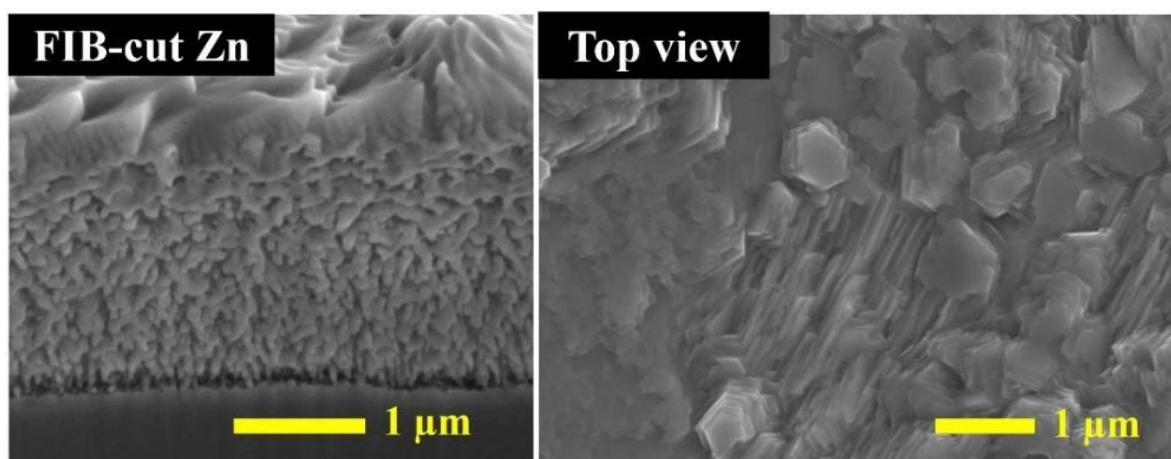


Figure S1. SEM images of cross section and top view of Zn layer of the bare specimen. The steel surfaces in this project were electrogalvanized steel with a ~ 2.5 μm zinc layer on top. The bonded zinc surfaces consist of numerous polygon structures that have < 2 μm length and long rugged bumpy line structures. The surface morphology is rough but does not seem to have interlocking structures which are normally deep valleys and high mountains.

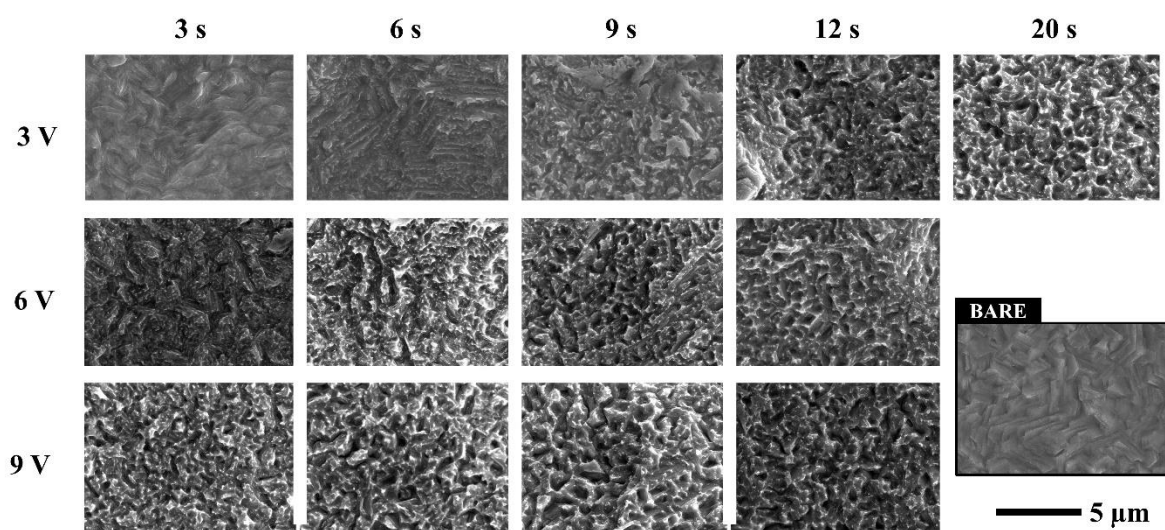


Figure S2. SEM images of top view of the electrochemically etched steel surfaces over different etching.

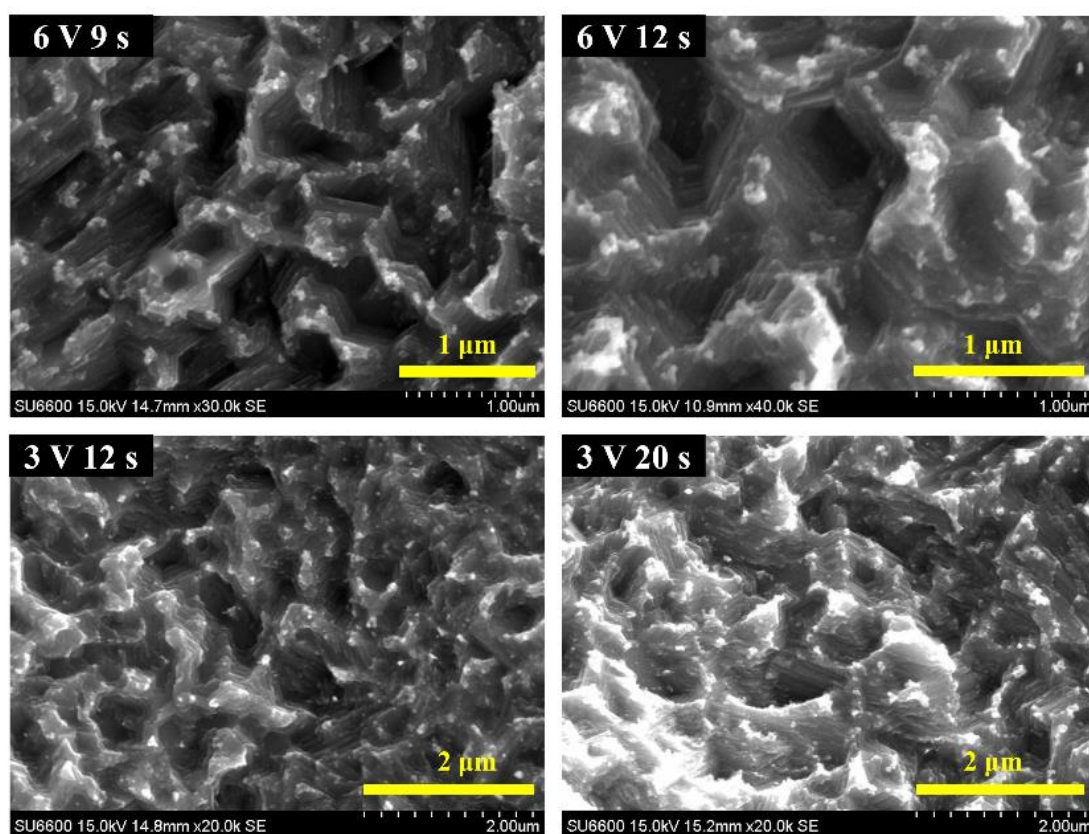


Figure S3. SEM images to show mechanical interlocking structures over different etching conditions.

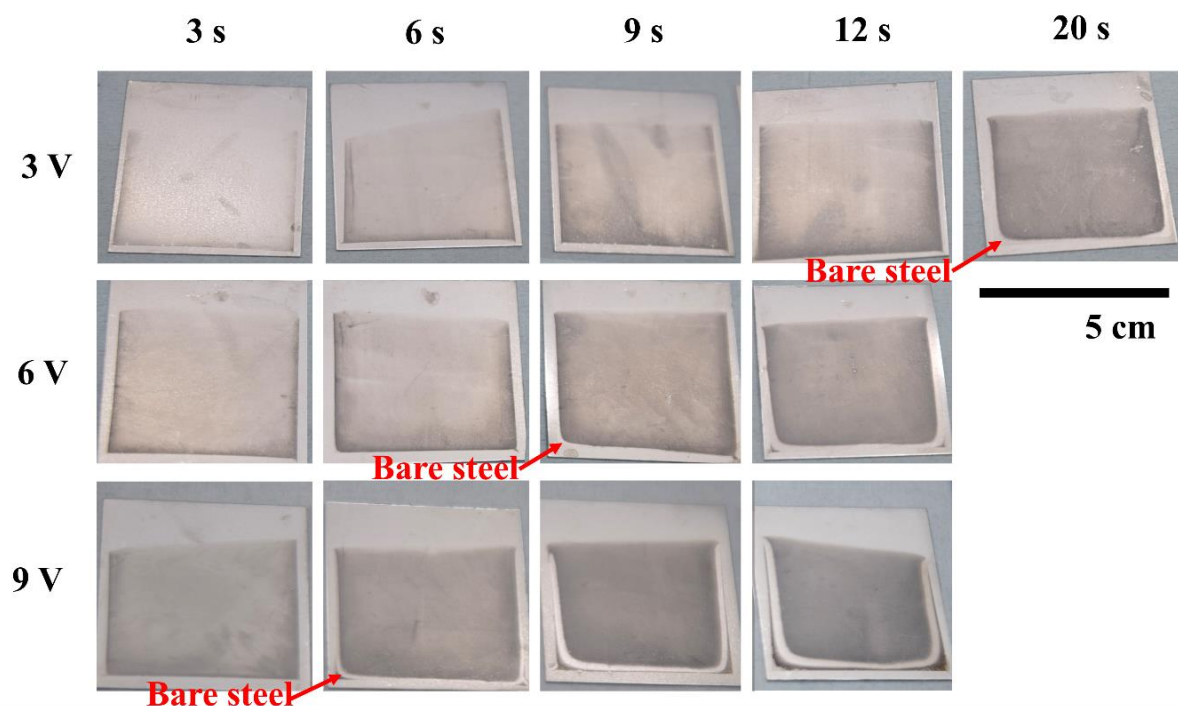


Figure S4. Optical images of the electrochemically etched EG steel surfaces over different etching voltages and times.

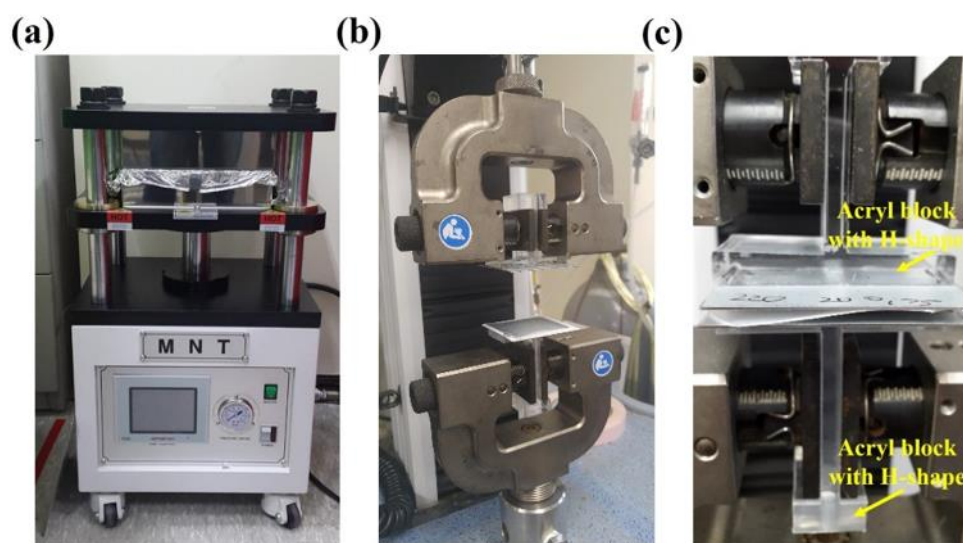


Figure S5. Equipment used for demonstration of adhesion. (a) Custom-made hot-press for manufacture of steel sandwich sheet, and (b) steel sandwich sheet clamped in a tensile testing machine for measurement of adhesion strength. (c) Image of the steel sandwich sheet separated after adhesion test.

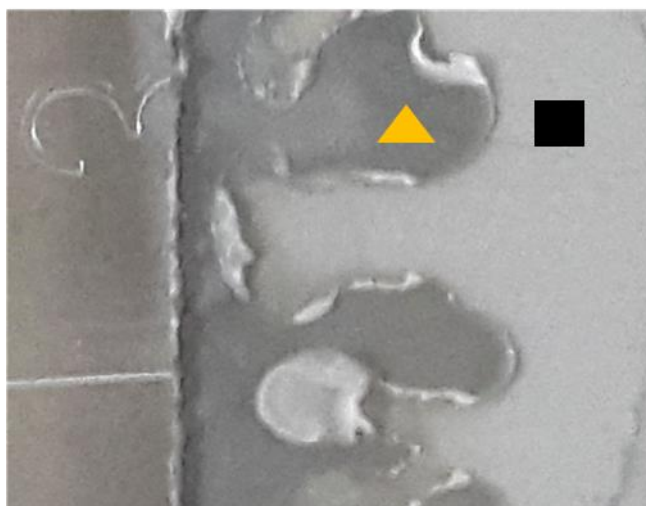


Figure S6. Optical image of EG steel sheet after normal adhesion test.