SUPPLEMENTARY INFORMATION

Enhancement of hydrogen evolution reaction kinetics in alkaline media by fast galvanic displacement of nickel with rhodium – from smooth surface to electrodeposited nickel foam

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**Figure S1.** HER polarization curves of Pt-poly disk (roughness factor 7.87) in 0.5 mol dm$^{-3}$ H$_2$SO$_4$ solution at 5 mV s$^{-1}$. Electrode was rotated at 1800 rpm to remove any H$_2$ bubble formed. Electrolyte resistance was compensated by 80% using hardware settings, with positive feedback scheme.

**Figure S2.** Cyclic voltammograms of polished Ni-poly, after 10 s, and after 20 s of exchange with Ni. Bottom right cyclic voltammograms are normalized to geometric surface and recorded at a common potential sweep rate of 100 mV s$^{-1}$. 
**Figure S3.** Surface integral of the height profiles obtained using 3D reconstruction of SEM images under magnification of ×5,000.

**Figure S4.** SEM image, EDX spectra and EDX elemental maps of commercial NF electrode after 10 min of exchange with Rh.
**Figure S5.** SEM images of identical location on Ti mesh before (left) and after Ni deposition (right), showing 15 μm thick Ni deposit with a highly developed surface due to hydrogen bubble templating during deposition.

**Figure S6.** SEM images of the same spot at the Ni-dep electrode before (left) and after 30 s of exchange with Rh (right). Magnification is ×10,000
Figure S7. SEM images under different magnifications of Ni-dep electrode after 5 min of exchange with Rh.