

SUPPORTING INFORMATION

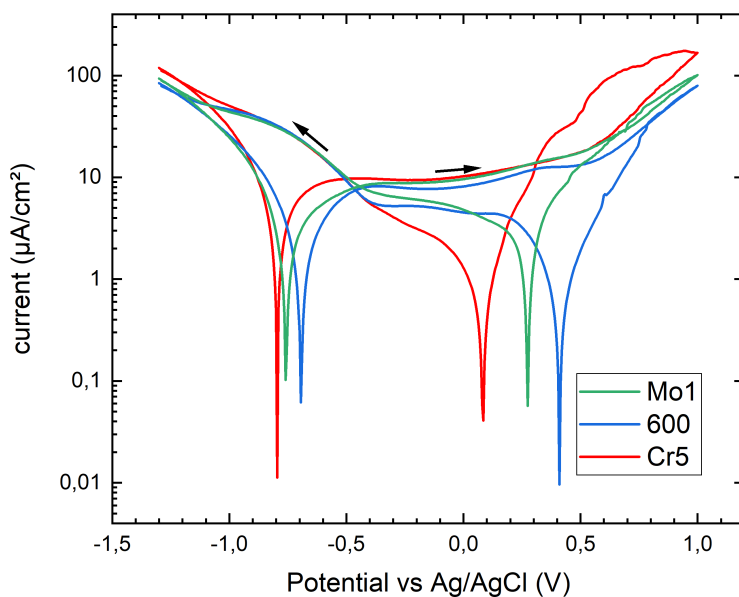


FIG. S1. Polarization curves recorded for all alloys used in 1 mM NaCl solution at 1 mV/s. During repassivation, at 0.2V which was used for ICP-MS studies as repassivation/preconditioning potential, all alloys are repassivated, with Cr5 showing the highest passive current. At transpassive conditions at 1V Cr5 shows the highest corrosion current, followed by Mo1 and alloy 600, which is in line with ICP-MS data (see main manuscript for details).

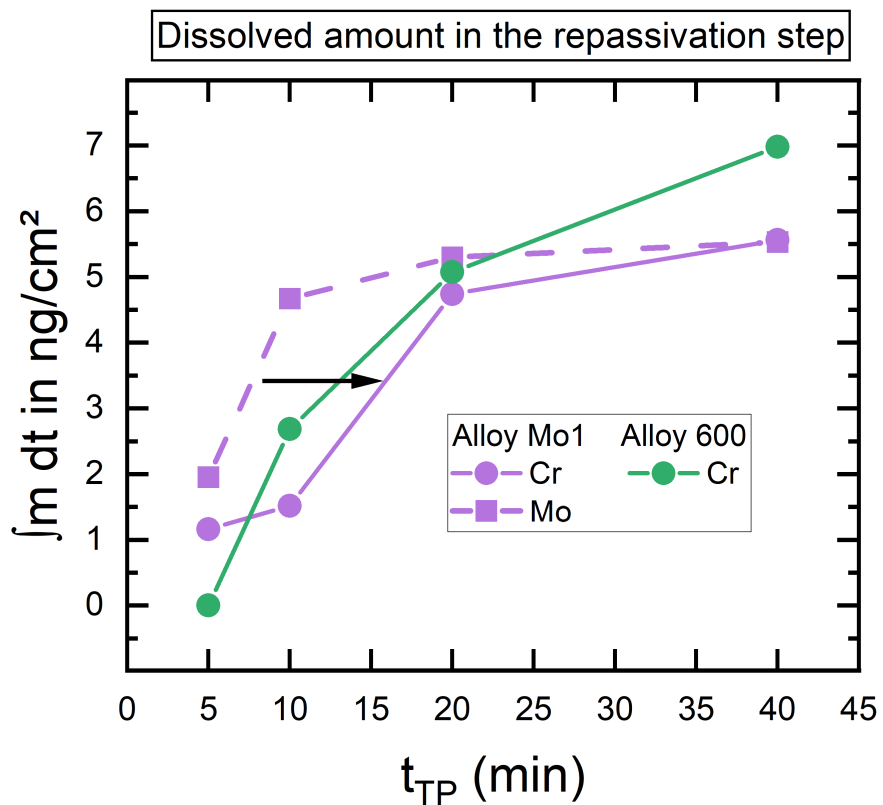


FIG. S2. Integrated mass release during repassivation as a function of increasing time during transpassive dissolution. The data is corrected for diffusion broadening,²¹ and sums up material release during repassivation at 0.2V after 40 minutes of transpassive corrosion for alloy 600 (squares) and alloy Mo1 (points), respectively.

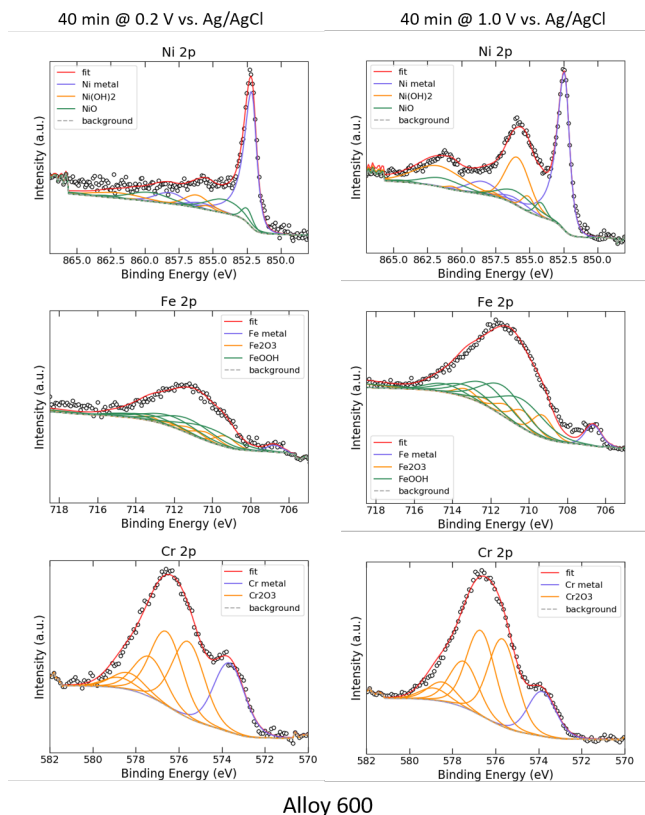


FIG. S3. XPS core level spectra of alloy 600 after passivation and repassivation. The data can be well fit using standard tabulated peak positions of reference materials (NIST database) and multiplet splitting as indicated and described in the methods section. Please note that spectra are shown in arbitrary units to enhance visibility of fittings, the quantitative peak analysis is summarized in the main part. (Left) Ni 2p, Fe 2p and Cr 2p spectra are shown after 40 minutes polarization under passive conditions at 0.2V. The nickel spectra show almost exclusively metallic signal, and only very small amounts of hydroxide and oxide were found. The iron spectrum indicates FeO(OH) and minor amounts of Fe₂O₃, and the chromium spectrum can be fit well with a metallic and a single component Cr₂O₃ component. (Right) Ni 2p, Fe 2p and Cr 2p spectra are shown after 40 minutes polarization under transpassive conditions at 1V. The nickel spectra indicate more hydroxide and oxide with respect to the metallic peak. The iron spectrum indicates FeO(OH) and minor amounts of Fe₂O₃, and the chromium spectrum can be fit well with a metallic and a single Cr₂O₃ component.

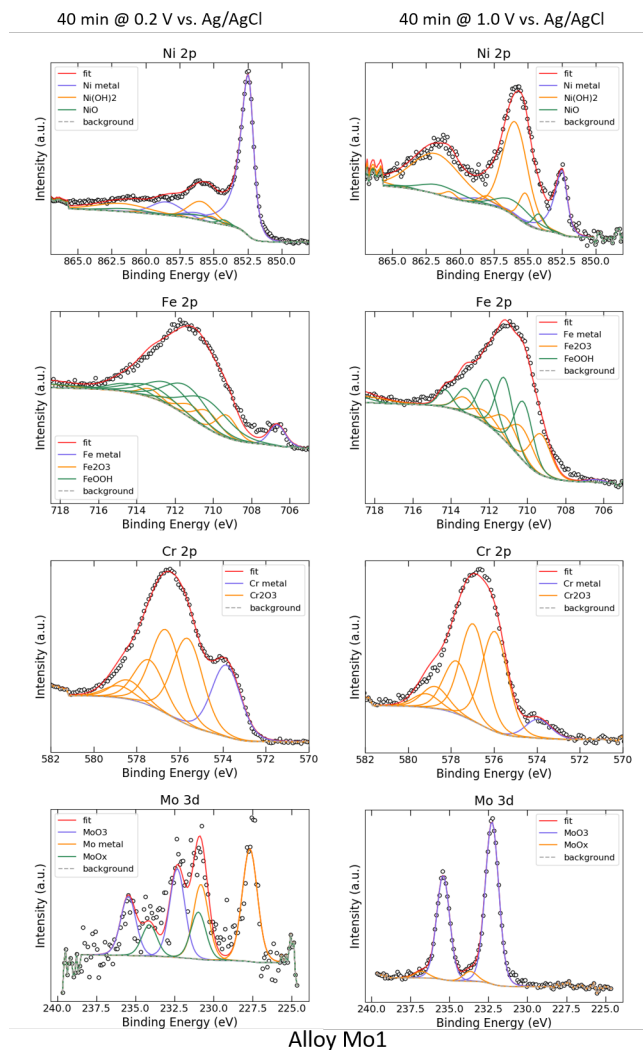


FIG. S4. XPS core level spectra of alloy Mo1 after passivation and repassivation. The data can be well fit using standard tabulated peak positions of reference materials (NIST database) and multiplet splitting as indicated and described in the methods section. Please note that spectra are shown in arbitrary units to enhance visibility of fittings, the quantitative peak analysis is summarized in the main part. (Left) Ni 2p, Fe 2p, Cr 2p and Mo 3d spectra are shown after 40 minutes polarization under passive conditions at 0.2V. The nickel spectra show a strong metallic signal, and only very small amounts of hydroxide and oxide were found. The iron spectrum indicates FeO(OH) and minor amounts of Fe₂O₃, and the chromium spectrum can be fit well with a metallic and a single component Cr₂O₃ component. Molybdenum spectra indicate a metallic, a Mo(IV) and a Mo(VI) component. (Right) Ni 2p, Fe 2p, Cr 2p and Mo 3d spectra are shown after 40 minutes polarization under transpassive conditions at 1V. The nickel spectra show a very weak metallic signal, and hydroxide and oxides were found. The iron spectrum indicates FeO(OH) and minor amounts of Fe₂O₃, and the chromium spectrum can be fit well with a weak metallic and a single Cr₂O₃ component. Molybdenum spectra indicate a strong Mo(VI) component and minor amounts of Mo at higher binding energies, which may correlate with molybdates.

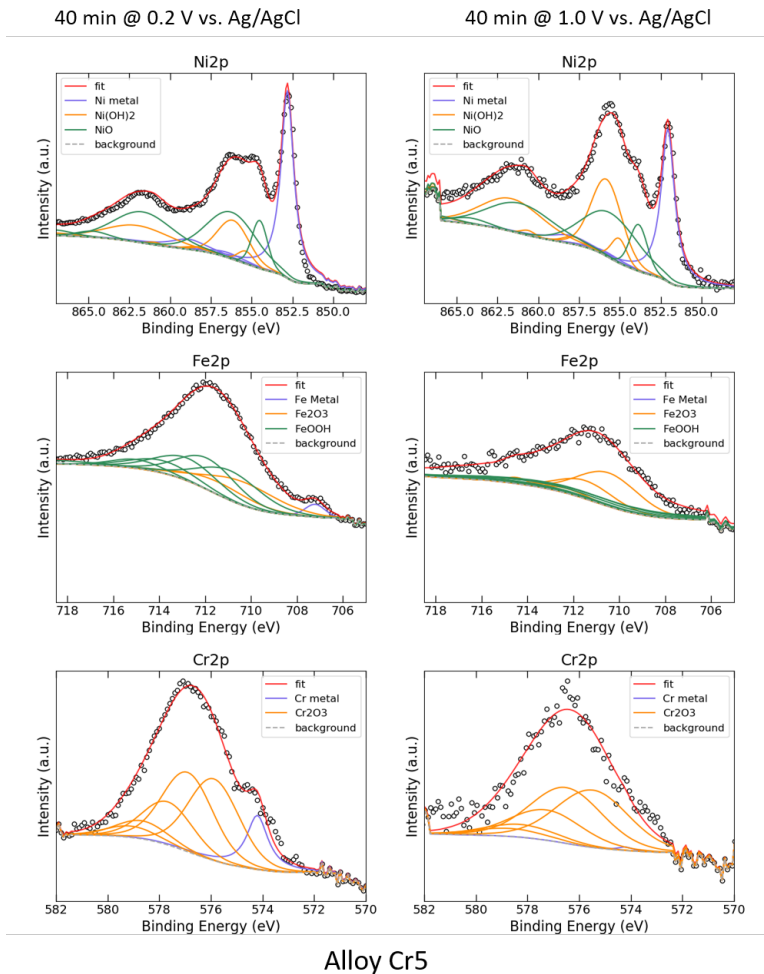


FIG. S5. XPS core level spectra of alloy Cr5 after passivation and repassivation. The data can be well fit using standard tabulated peak positions of reference materials (NIST database) and multiplet splitting as indicated and described in the methods section. Please note that spectra are shown in arbitrary units to enhance visibility of fittings, the quantitative peak analysis is summarized in the main part. (Left) Ni 2p, Fe 2p and Cr 2p spectra are shown after 40 minutes polarization under passive conditions at 0.2V. (Right) Ni 2p, Fe 2p and Cr 2p spectra are shown after 40 minutes of polarization under transpassive conditions at 1V.

40 min @ 0.2 V vs. Ag/AgCl
Bulk dissolved - NBA 600

40 min @ 1.0 V vs. Ag/AgCl
Crevice region - NBA 600

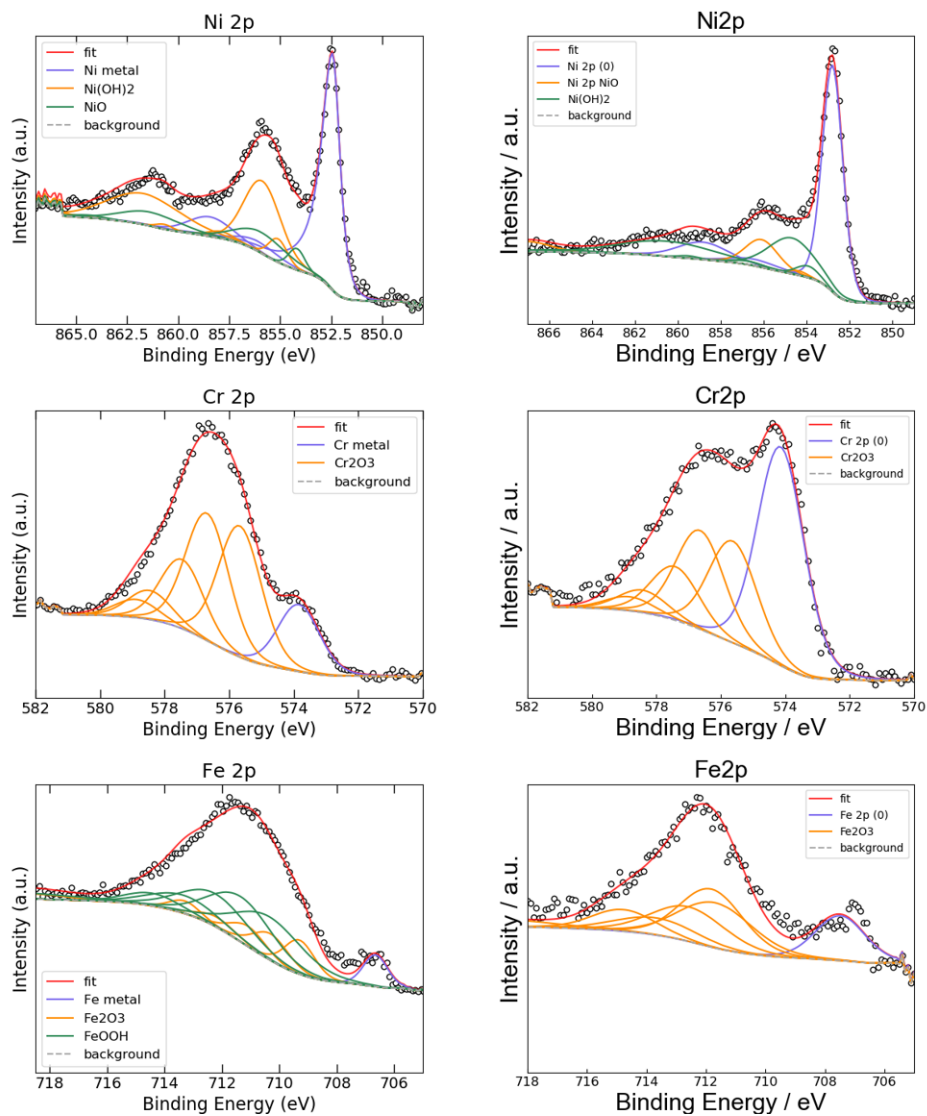


FIG. S6. XPS core level spectra of alloy 600 after 40 min of polarisation at 1.0 V vs Ag/AgCl. Comparison of the open area (left) and the crevice region (right).

40 min @ 0.2 V vs. Ag/AgCl
Bulk dissolved – **NBA Mo1**

40 min @ 1.0 V vs. Ag/AgCl
Crevice region – **NBA Mo1**

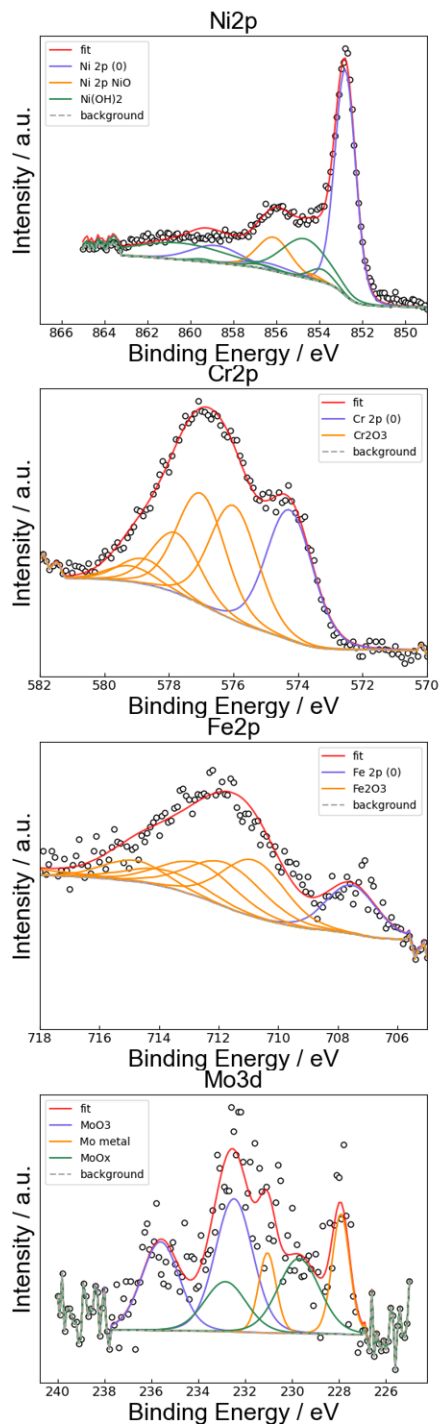
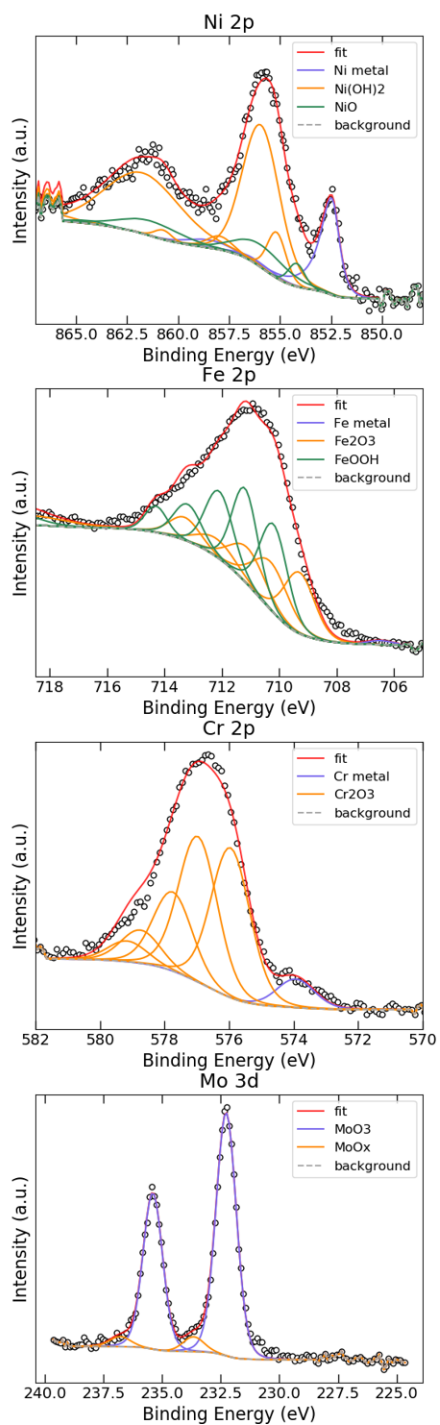


FIG. S7. XPS core level spectra of alloy Mo1 after 40 min of polarisation at 1.0 V vs Ag/AgCl. Comparison of the open area (left) and the crevice region (right).