coatings

Supplementary Materials: Corrosion Resistance of Mild Steel Coated with Phthalimide-Functionalized Polybenzoxazines

1. Characterization

Infrared spectra of all the samples were recorded in the solid state over the spectral range from 4000 to 400 cm^{-1} using the KBr method in a Shimadzu 2110 PC Scanning Spectrophotometer. NMR spectra were recorded using a BRUKER400 MHz instrument, with $CDCl_3$ and DMSO-d_6 as the solvents and tetramethylsilane (TMS) as the external standard. DSC was performed under a N_2 atmosphere using a DSC Q20 V24.11 Build 124 calorimeter from 30 to 300 °C at a heating rate of 20 °C min^{-1}. TGA was performed under an atmosphere of N_2 using a DTG-60H instrument operated at a heating rate of 20 °C min^{-1}. The WCAs of uncoated and coated MS were estimated using a Theta light instrument (TL 100 and TL 101, Biolin Scientific Company, Espoo, Finland) operated at ambient temperature; a deionized water droplet (2 μL) was injected on the sample surface. Each measurement was repeated three times; the mean and standard deviation (SD) were determined under the same conditions. The surface morphology of the uncoated and coated MS samples was investigated using scanning electron microscopy (SEM; JEOL JSM-7610 F, Tokyo, Japan).

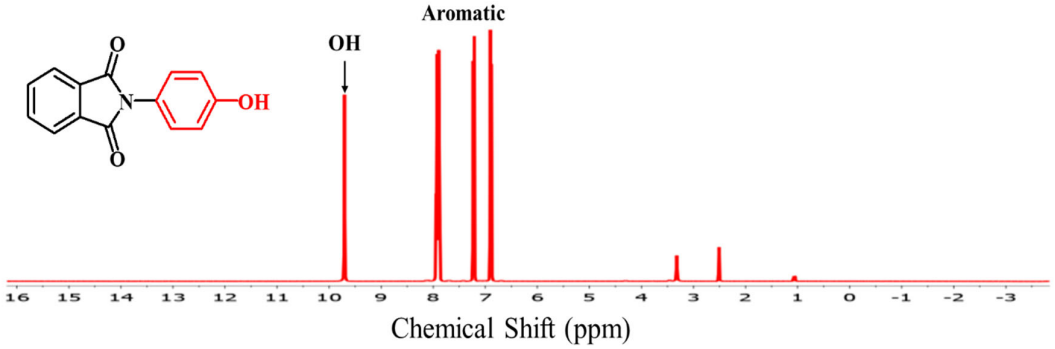

Figure S1. ^{1}H NMR spectrum of *p*-PP.

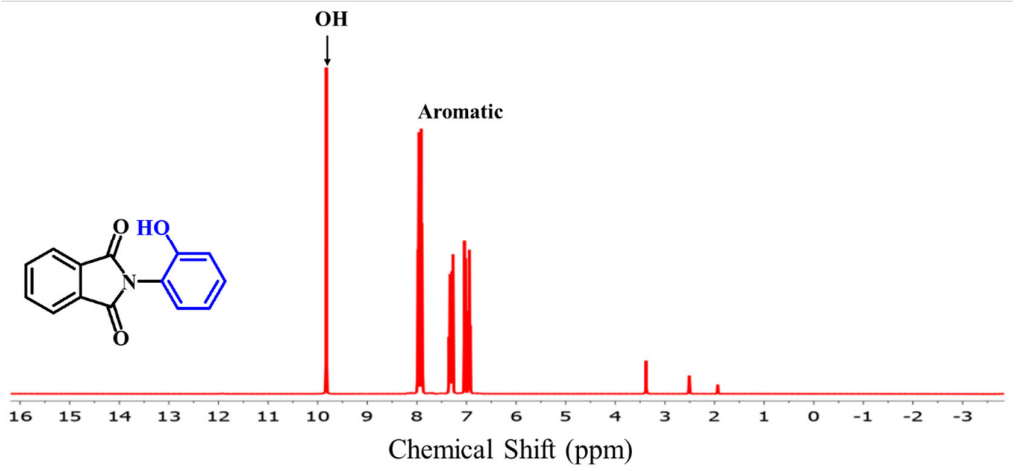

Figure S2. ^{1}H-NMR spectrum of *o*-PP.

Table 1. Water contact angles (WCAs) results (mean ± SD) of uncoated MS and MS coated with *p*PP-BZ and *o*PP-BZ at various curing temperatures and recorded prior to corrosion tests.

Samples	Curing Temperature (°C)	Water Contact Angle Mean ± SD
MS	-	70.7 ± 1.11°
*p*PP-BZ	150	92.8 ± 0.30°
	180	102.1 ± 0.81°
	210	95.6 ± 0.44°
MS	-	70.7 ± 1.11°
*o*PP-BZ	150	91.5 ± 0.34°
	180	99.2 ± 0.78°
	210	93.4 ± 0.25°

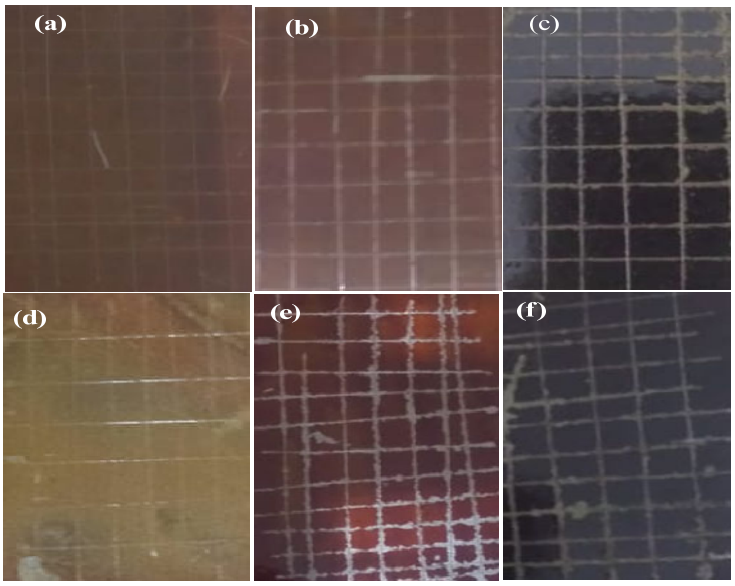

Figure S3. photographs of the scalpel-cut of MS coated with (**a**) poly(*p*PP-BZ)$_{150}$, (**b**) poly (*p*PP-BZ)$_{180}$ and (**c**) poly(*p*PP-BZ)$_{210}$, (**d**) poly (*o*PP-BZ)$_{150}$, (**e**) poly (*o*PP-BZ)$_{180}$ and (**f**) poly (*o*PP-BZ)$_{210}$.

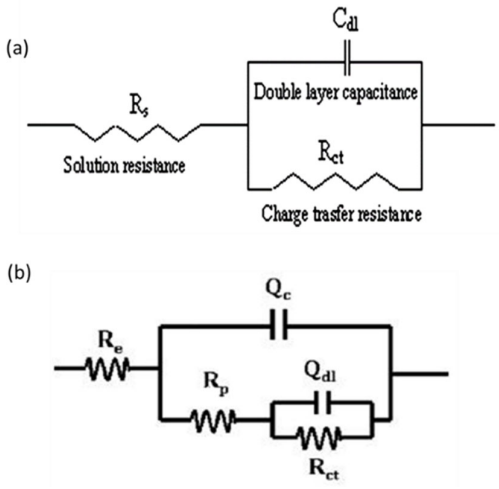

Figure S4. Equivalent circuit models with (**a**) one time constant (uncoated MS) and (**b**) two-time constants (coated MS) used to fit the impedance data.

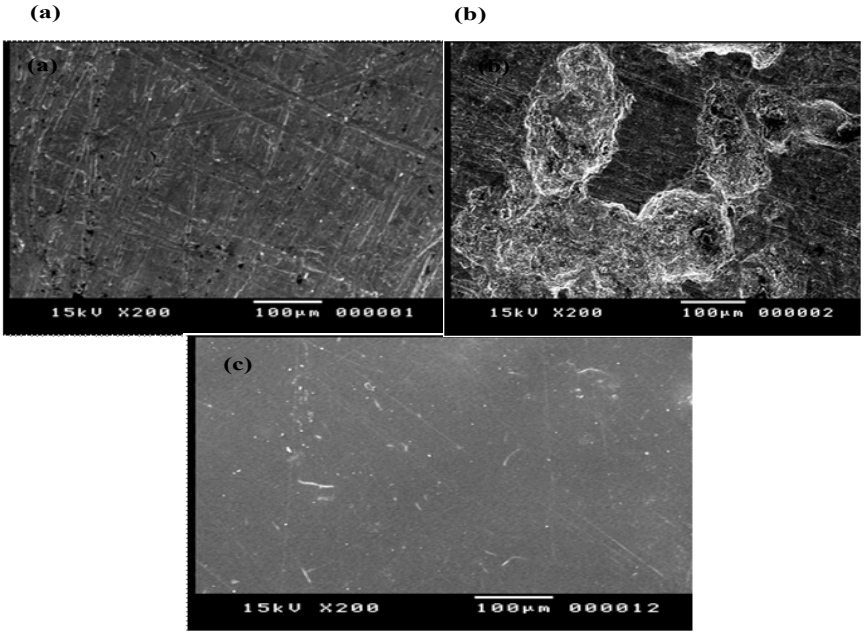

Figure S5. SEM surface images of (**a**) polished MS, (**b**) uncoated MS after immersing in a 3.5 wt.% aqueous solution of NaCl, and (**c**) coated MS with poly (*p*PP-BZ)$_{180}$.