**Supplementary data**

**Improved self-healing performance of polymeric nanocomposites reinforced with talc nanoparticles (TNPs) and urea-formaldehyde microcapsules (UFMCs)**

Sehrish Habib1, Eman Fayyed1, Abdul Shakoor1\*, Ramazan Kahraman2, Aboubakr Abdullah1

1Center for Advanced Materials (CAM), Qatar University, 2713 Doha, Qatar.

2Department of Chemical Engineering, Qatar University, 2713 Doha, Qatar.

\* Corresponding Authors: shakoor@qu.edu.qa Tel: +974–44036867, 974-6612-5107.

 

Fig S1: TEM analysis of a) as received TNPs and TNPs loaded with NaNO3



Fig S2: Open circuit potential, EOCP vs. time, for steel substrate immersed in 3.5 wt % NaCl solution for blank epoxy and modified polymeric nanocomposite coatings 25°C.

Fig S3: Nyquist plots for a) blank epoxy coatings, b) polymeric nanocomposite coatings containing 1 wt.% TNPs and c) polymeric nanocomposite coatings containing 3 wt.% TNPs

**Table S1.** The obtained fitted electrochemical values of the EIS data for the blank epoxy and the developed polymeric nanocomposites immersed in 3.5 wt % NaCl for different immersion times at room temperature.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Coatings | Time(h) | *R*po(MΩ.cm2) | CPE1 (sn Ω−1cm−2) | n1 | *R*ct(MΩ.cm2) | CPE2 (sn Ω−1 cm−2) | n2 | *Rs*(Ohms) | *W*(sn Ω−1 cm−2) | *IE**(%)* | Goodness of fit |
| Scratched Blank epoxy | 24487296120 | 0.270.110.070.050.01 | 2.67 x 10-96.01 x 10-61.30 x 10-51.72 x 10-41.45 x 10-2 | 0.750.830.820.750.66 | 0.460.200.170.090.01 | 1.94 x 10-104.78 x 10-10 8.34 x 10-10 1.07 x 10-91.16 x 10-6 | 0.710.880.790.810.63 | 775.8770.3778.4756.2750.8 | ----- | - | 1.03 x 10-41.73 x 10-43.59 x 10-43.33 x 10-46.80 x 10-4 |
| Scratched epoxy/1 wt % modified TNPs | 24487296120 | 4.541.4411.5660.6593.45 | 2.82 x 10-103.51 x 10-91.53 x 10-93.64 x 10-103.14 x 10-10 | 0.940.650.860.830.84 | 4.611.7512.1463.6293.63 | 7.68 x 10-77.99 x 10-61.43 x 10-86.99 x 10-111.03 x 10-11 | 0.900.620.840.890.80 | 796.5768.9760.2766.6772.8 | 6.9010.816.518.332.8 | 88.399.5 | 4.85 x 10-41.12 x 10-47.12 x 10-4 1.09 x 10-61.35 x 10-5 |
| Scratched epoxy/3 wt % modified TNPs | 24487296120 | 5.613.0058.58125.8204.8 | 1.69 x 10-91.29 x 10-46.63 x 10-56.79 x 10-101.91 x 10-10 | 0.830.600.820.730.82 | 6.153.0058.58125.80755.30  | 2.27 x 10-101.79 x 10-94.83 x 10-104.75 x 10-104.60 x 10-10 | 0.880.680.760.900.86 | 752.7749.5732.4724.2735.8 | 10.5013.0819.5022.2045.30 | 96.799.9 | 3.70 x 10-42.94 x 10-4 1.38 x 10-43.56 x 10-42.44 x 10-4 |