

SUPPLEMENTARY INFORMATION

BIOINSPIRED SELF-HEALING NICKEL COATING

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PUF microcapsules synthesis

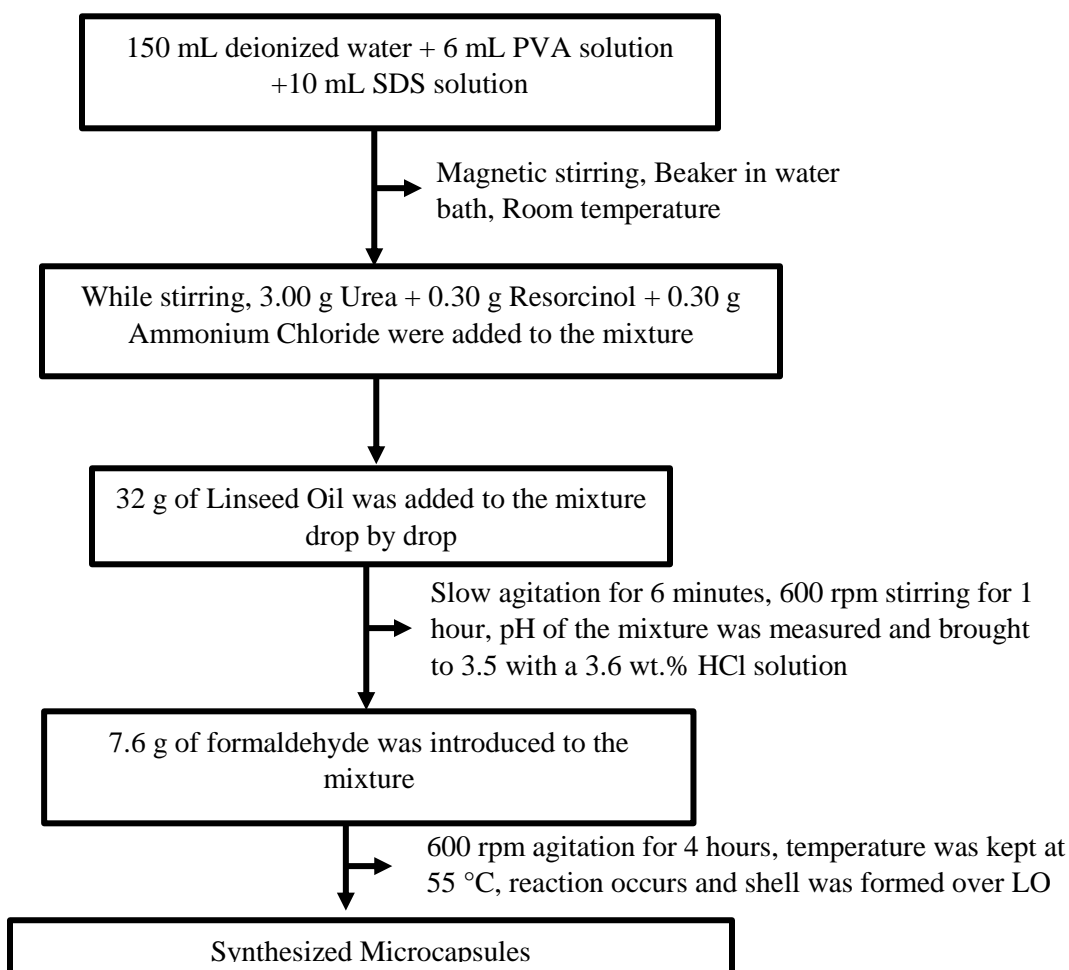


FIGURE S1: SYNTHESIS PROCEDURE OF PUF SHELL MICRO-CAPSULES CONTAINING LINSEED OIL.

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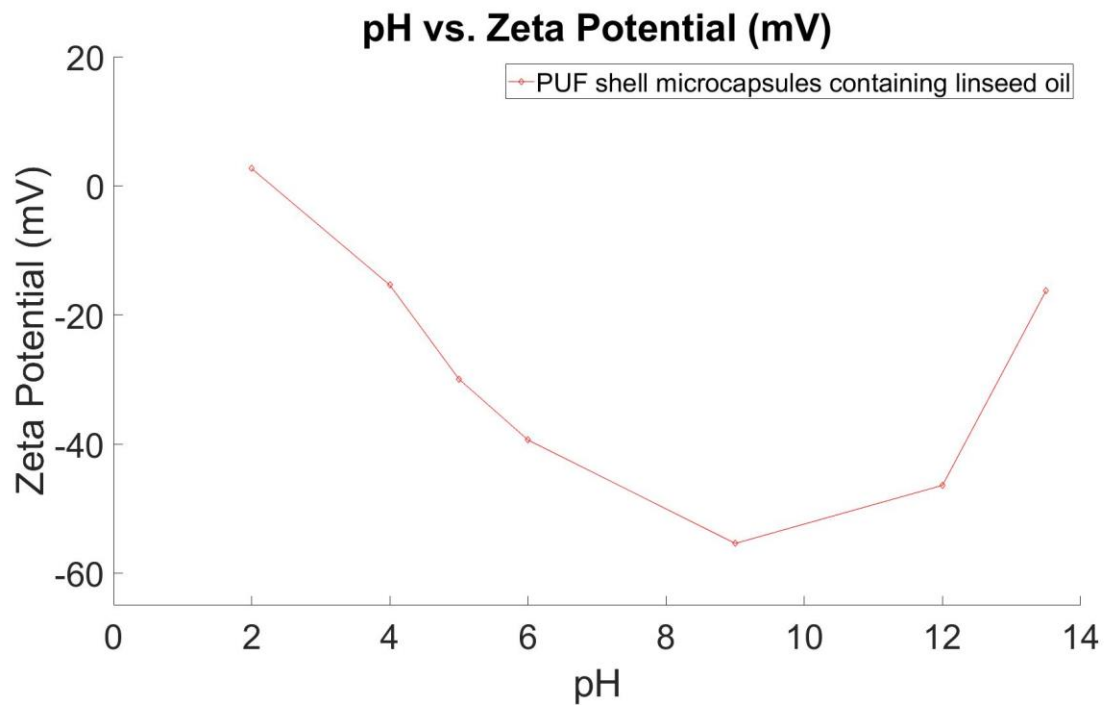


FIGURE S2: PH VS. ZETA POTENTIAL OF PUF SHELL MICROCAPSULES CONTAINING LINSEED OIL.

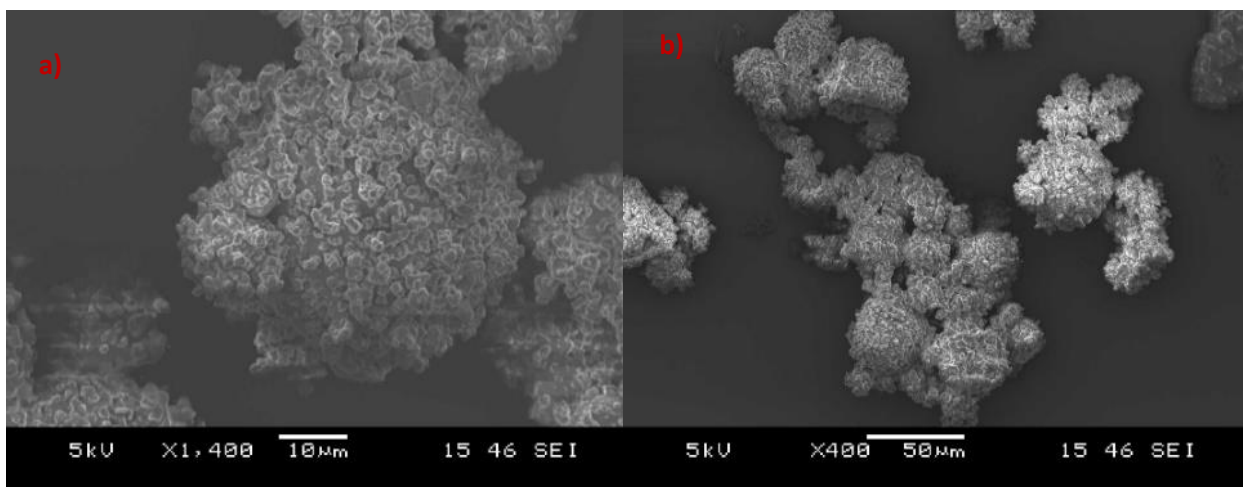


FIGURE S3: SIZE AND MORPHOLOGY OF SYNTHESIZED MICROCAPSULES. A) MICROCAPSULES EXHIBIT A ROUGH SURFACE WITH BRANCH-LIKE SPOTS (SIZE OF THE SCALE BAR: 10 μm), B) MICROCAPSULES HAVE A MEAN SIZE OF ~ 25 MICROMETERS (SIZE OF THE SCALE BAR: 50 μm).

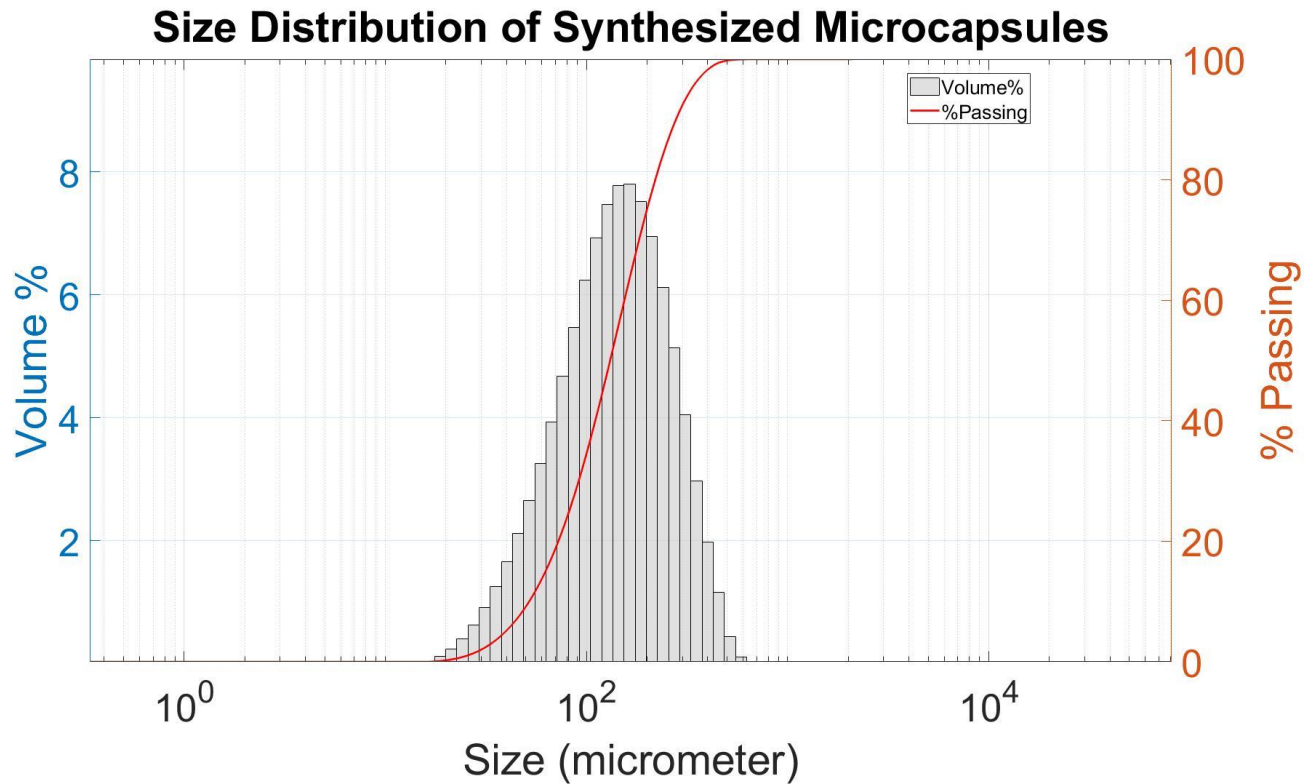


FIGURE S4: SIZE DISTRIBUTION OF MICROCAPSULES. SIZE OF THE MICROCAPSULES WAS MEASURED USING MASTERSIZER 3000 LASER DIFFRACTION PARTICLE SIZE ANALYZER.

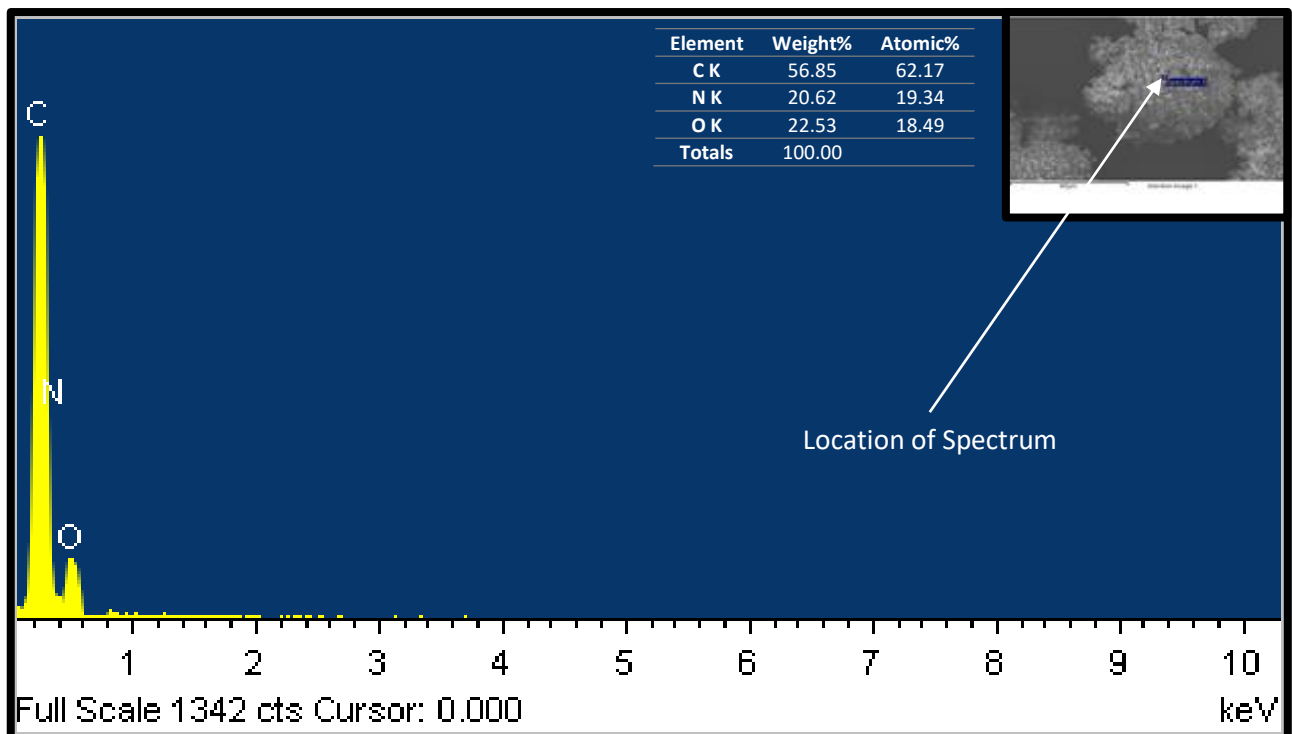


FIGURE S5: EDS ANALYSIS OF THE SURFACE OF THE SYNTHESIZED MICROCAPSULES.

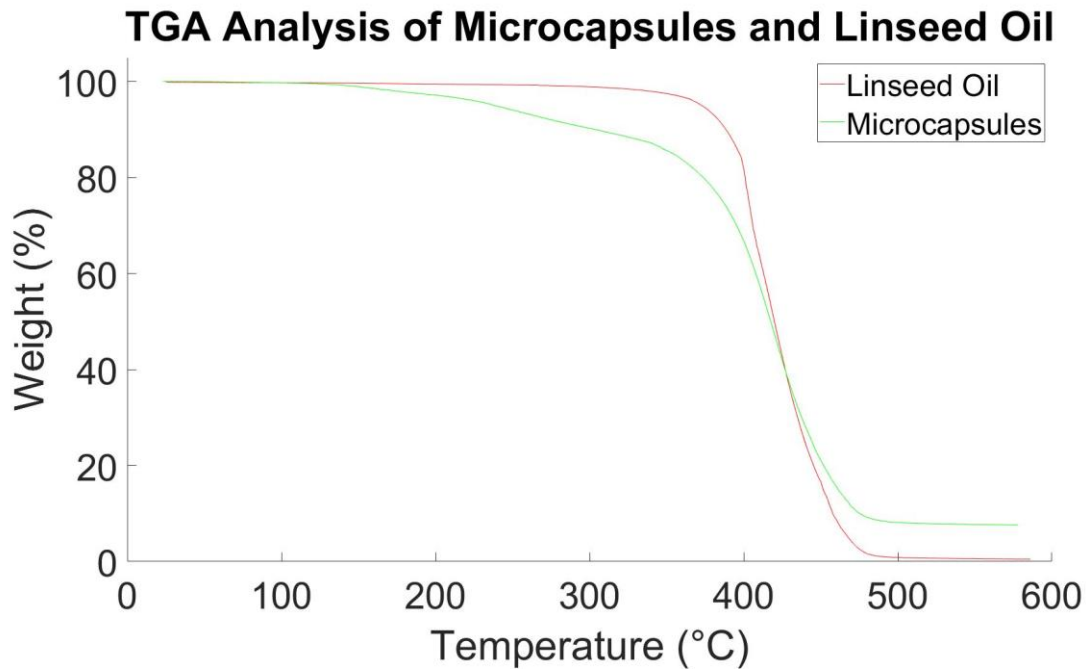


FIGURE S6: TGA ANALYSIS OF PUF SHELL MICROCAPSULES CONTAINING LINSEED OIL AND PURE UNENCAPSULATED LINSEED OIL PERFORMED IN AN ARGON GAS ENVIRONMENT.

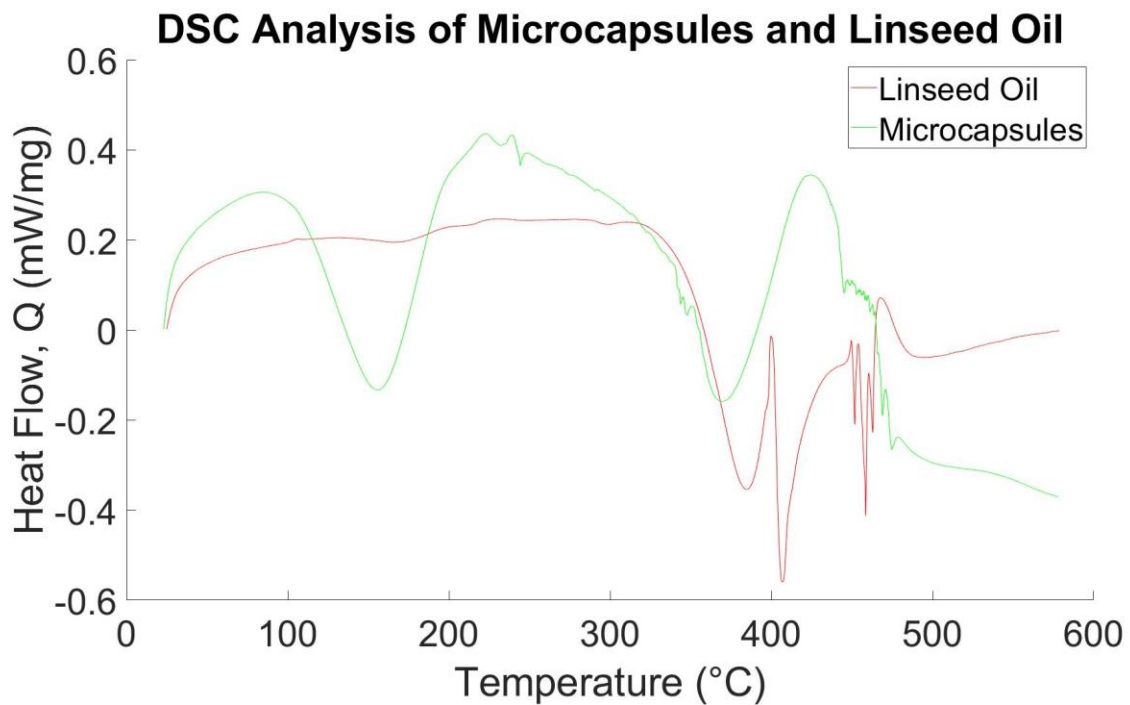


FIGURE S7: DSC ANALYSIS OF PUF SHELL MICROCAPSULES CONTAINING LINSEED OIL AND PURE UNENCAPSULATED LINSEED OIL PERFORMED IN AN ARGON GAS ENVIRONMENT.

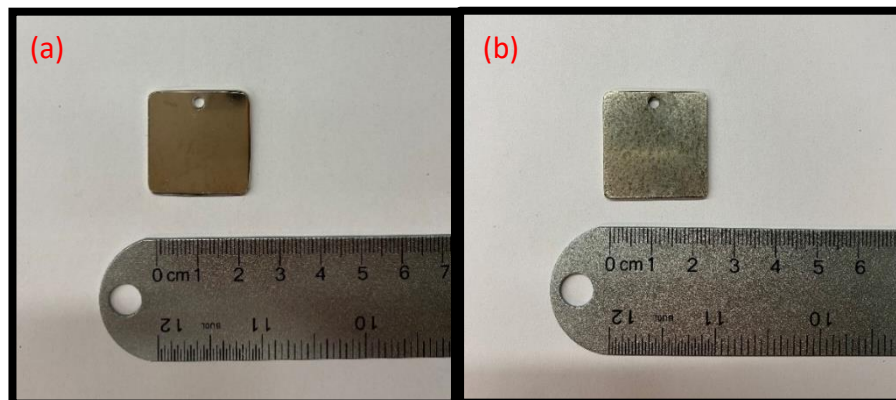


FIGURE S8: A) MILD STEEL PLATE SAMPLE COATED WITH NICKEL COATING, B) SAMPLE COATED WITH NI-PUF MICROCAPSULES SELF-HEALING COATING, THE QUANTITY OF MICROCAPSULES IS 10 G/L.

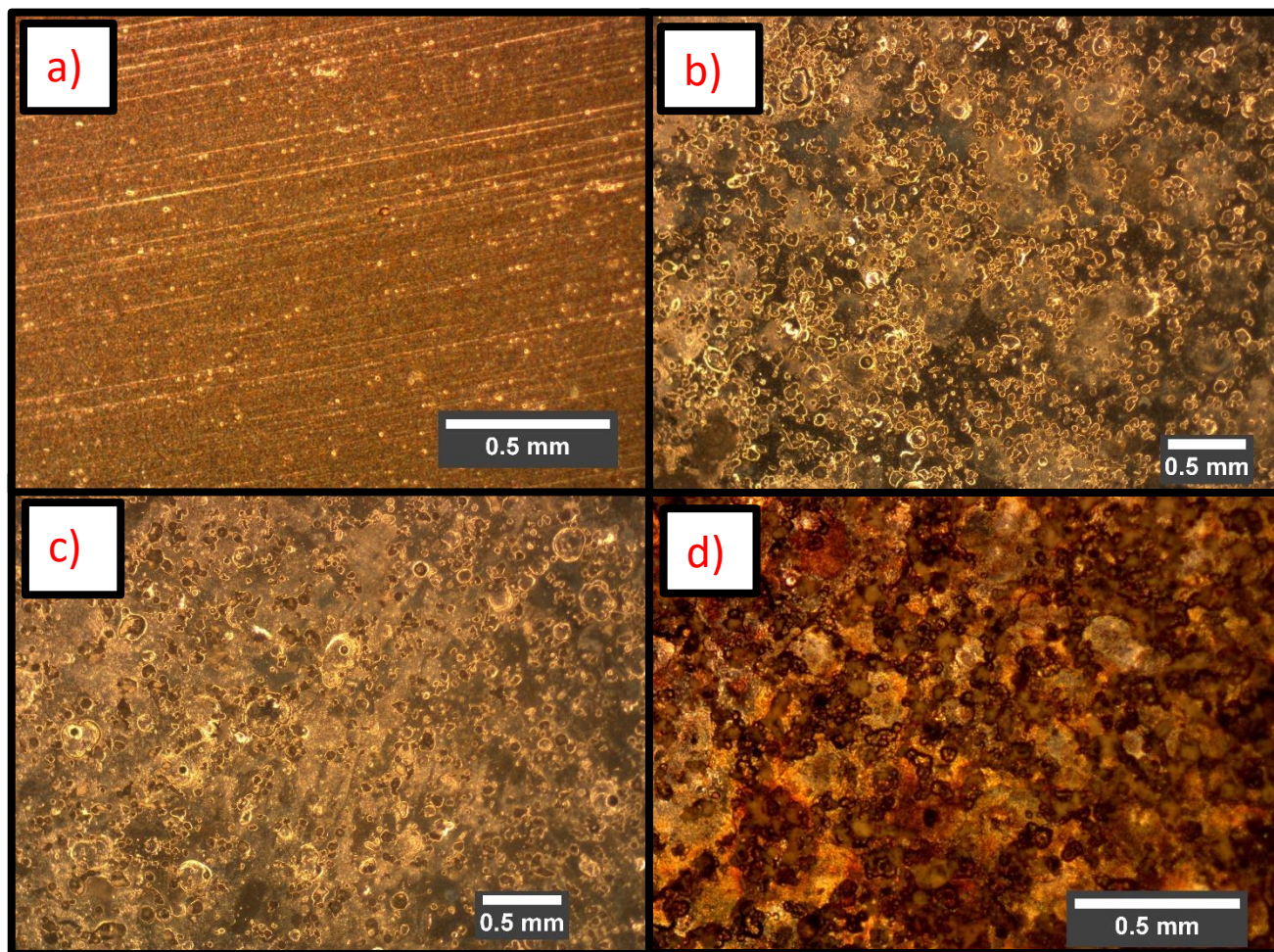


FIGURE S9: OPTICAL STEREO MICROGRAPHS OF NICKEL-PUF SHELL MICROCAPSULES SELF-HEALING COATING WITH VARYING MICROCAPSULE CONCENTRATIONS: (A) 0 G/L, (B) 10 G/L, (C) 20 G/L, AND (D) 30 G/L IN THE BATH.

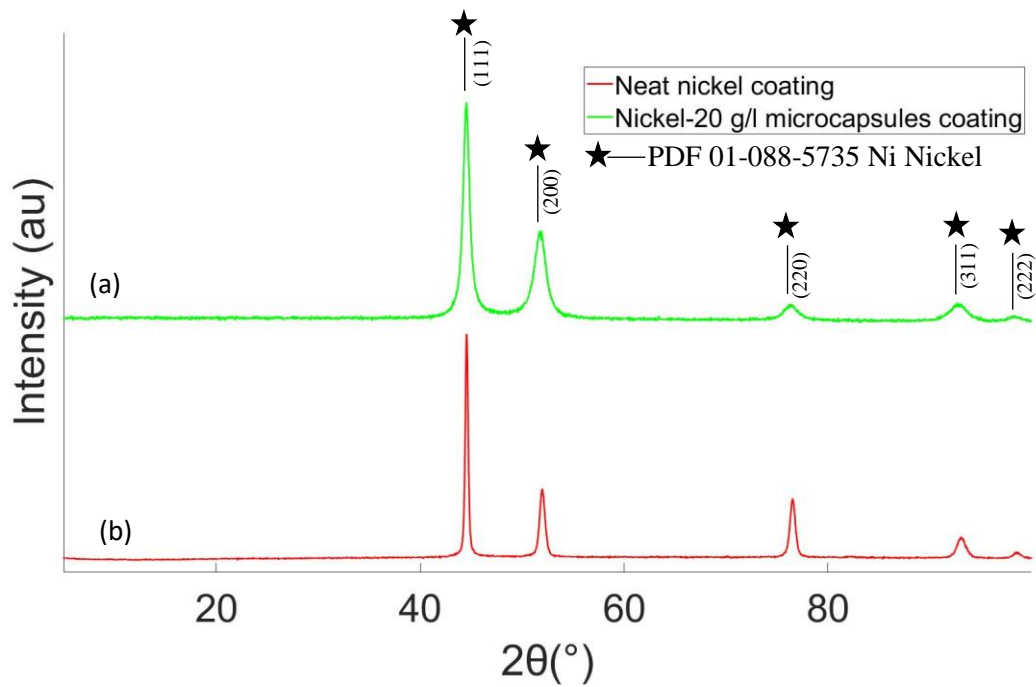


FIGURE S10: X-RAY DIFFRACTION PATTERNS FOR (A) NEAT NICKEL COATING, (B) NICKEL-20G/L MICROCAPSULES COATING.

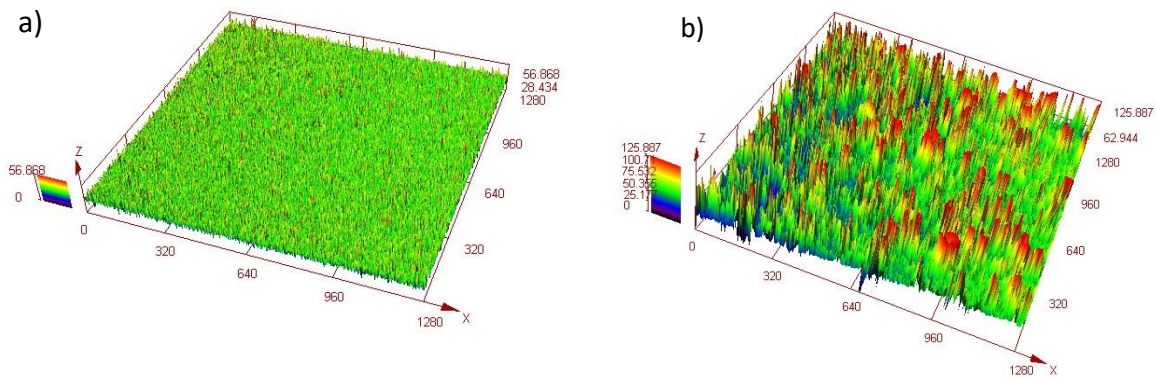


FIGURE S11: CONFOCAL LASER SCANNING MICROSCOPY SURFACE ROUGHNESS MEASUREMENTS FOR (A) NEAT NICKEL COATING, (B) NICKEL-20G/L MICROCAPSULES COATING, SHOWING THE 3D SURFACE.

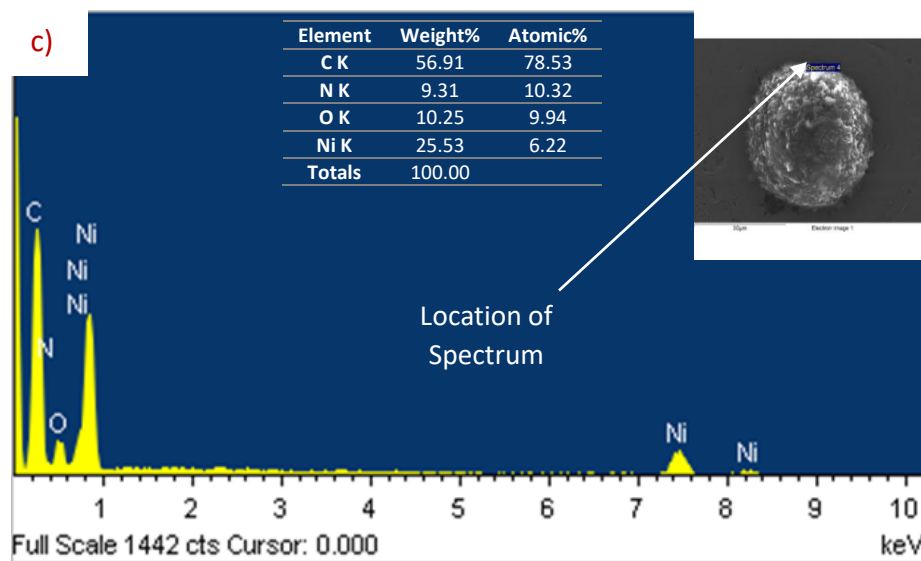
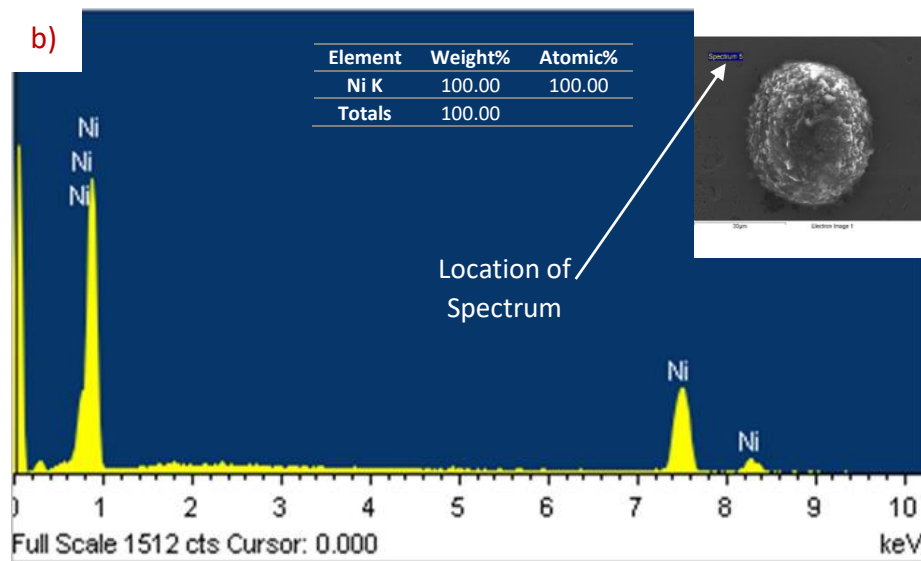
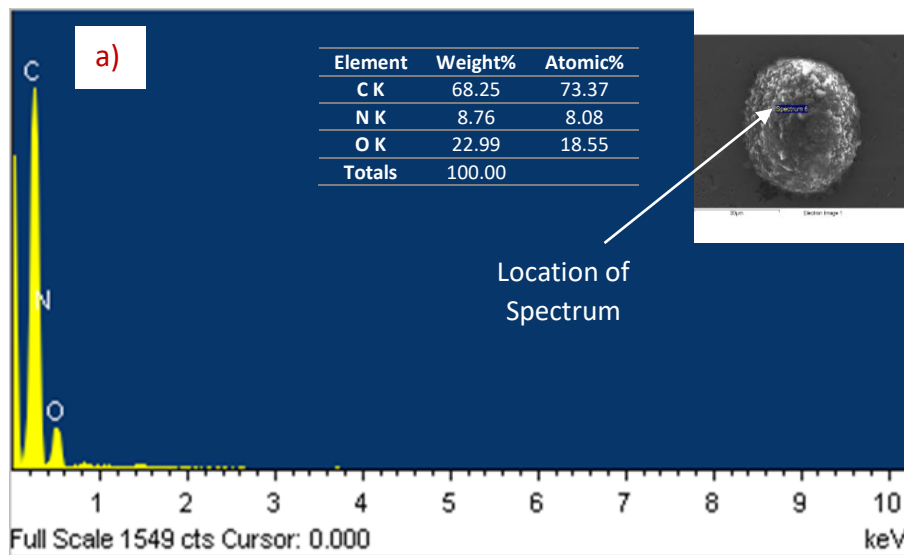


FIGURE S12: EDS ANALYSIS OF NI-PUF MICROCAPSULES SELF-HEALING COATING, SPECTRA FOR A) EXPOSED MICROCAPSULES, B) AREA SURROUNDED NICKEL COATING, C) MICROCAPSULES-NICKEL INTERFACE.

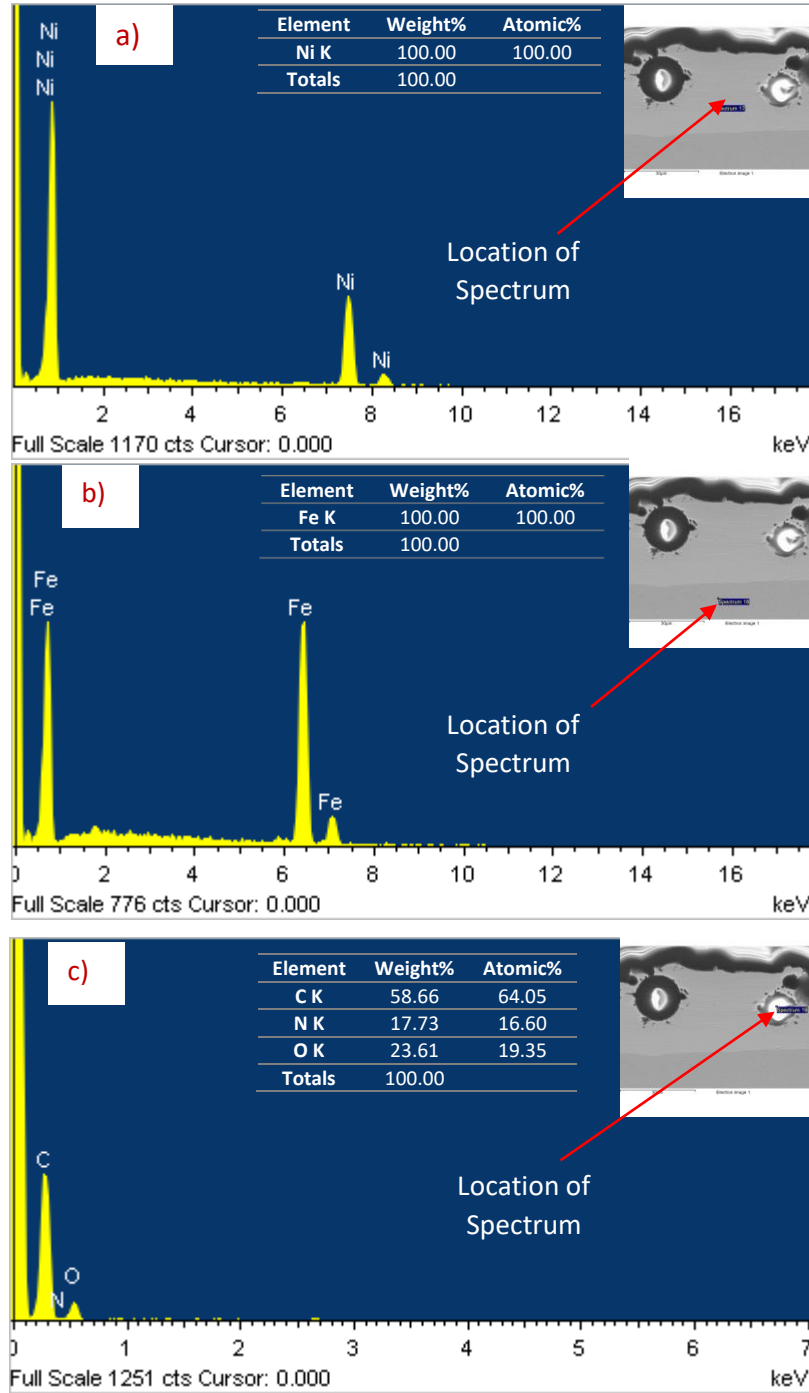










FIGURE S13: EDS ANALYSIS OF THE CROSS-SECTIONAL AREA OF Ni-PUF MICROCAPSULES SELF-HEALING COATING; SPECTRA FOR A) NICKEL DEPOSIT, B) MILD STEEL SUBSTRATE, C) SURFACE OF MICROCAPSULE.

TABLE S1: THE IMAGES FROM THE IMMERSION TEST ACCORDING TO ASTM G31 IN 3.5% NaCl SOLUTION TO ASSESS THE CORROSION PROTECTION OF SELF-HEALING COATINGS

Amount of Microcapsules		0 g/l	10 g/l	20g/l	30 g/l
Elapsed Time	0 hours				
	6 hours				
	24 hours	