Supporting Information

S1. Measurements and Characterization

FTIR spectral analyses were carried out by attenuated total reflection (ATR) method using the Shimadzu IR-Affinity-1S instrument. NMR spectra were recorded by Bruker (400 MHz) using deuterated chloroform ($CDCl_3$) as solvent and tetramethylsilane (TMS) as an internal standard. Differential scanning calorimetric analysis was performed on DSC 6000 Perkin Elmer for a monomer using an empty aluminum pan as a reference with a heating rate of $5^oC\ min^{-1}$ in nitrogen atmosphere. The temperature and heat flow scale of the instrument was calibrated under N_2 purge (20 mL min^{-1}) at a scanning rate of $5^oC\ min^{-1}$. Thermogravimetric analysis (TGA) was conducted by TGA 4000 Perkin Elmer, taking 5 mg of the sample under N_2 flow (30 mL min^{-1}) and controlling the heating rate at $20^oC\ min^{-1}$. The values of water contact angle of the polybenzoxazines was measured by a Kyowa goniometer and 5 μL water was used as the probe liquid. The optical density in MTT assay was measured at 570 nm using the Thermo Scientific Multiskan Go instrument (Thermo Scientific SkanIt software version 3.2). The corrosion experiments on low carbon mixed (0.25%) mild steel specimen and 30 μm polymer coated mild steel specimens were carried out using open-circuit potential (OCP), electrochemical impedance spectroscopy (EIS) and potentio-dynamic polarisation.

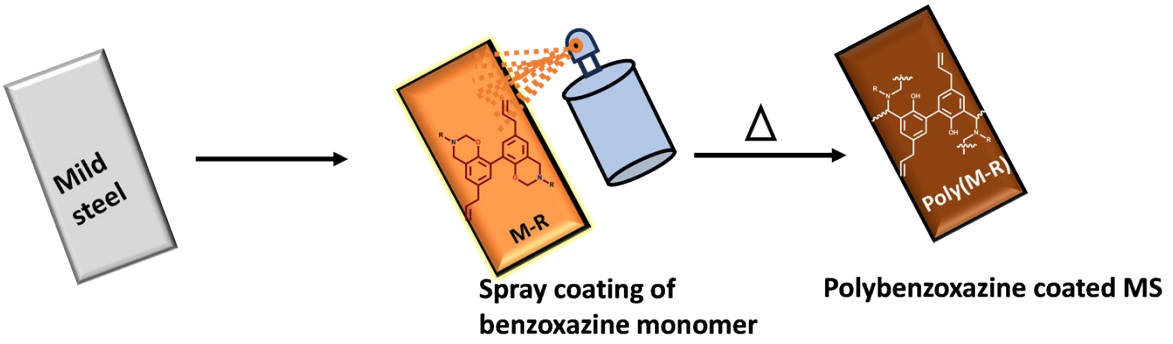
S2. Assessment of antimicrobial activity through well diffusion method

Antimicrobial activity of the synthesized magnolol based benzoxazines was carried out by agar well diffusion method. Escherichia coli (E. coli, ATCC 53868) a gram-negative bacteria and Staphylococcus aureus (S. aureus, ATCC 6538) gram-positive bacteria were used as a target bacterium to investigate the antibacterial activity. The bacterial cultures were grown in nutrient broth and further plated on petri plates using nutrient agar. After solidification of nutrient agar on plates, wells were punched. Further wells were loaded with ampicillin, an antibiotic which was considered as a standard, chloroform as a control and 1 mg/ml of benzoxazine monomer. After loading the culture plates were incubated at 37°C overnight. After completion of incubation, the culture plates were checked for the activity. The inhibition zones formed around the samples loaded in the wells were measured and reported.

S3. Preparation of mild steel (MS) specimen for corrosion resistance

MS plate of size 1 x 1 x 0.2 cm was chosen as a substrate for coating of benzoxazine monomers. To start with, the MS plates were washed and sonicated with ethanol to remove the impurities. The synthesized magnolol based benzoxazine resins *viz.* M-dda, M-ffa, M-oda and M-ole were separately spray coated on the individual MS plate. The benzoxazine coated MS was cured

step-wise to achieve polymerization of magnolol based monomers (Scheme S1). After ensuring the complete curing the MS plate containing polybenzoxazine was tested for its corrosion resistance properties using electrochemical impedance spectroscopy.



Scheme S1. Schematic pathway for the preparation of benzoxazine coated mild steel.

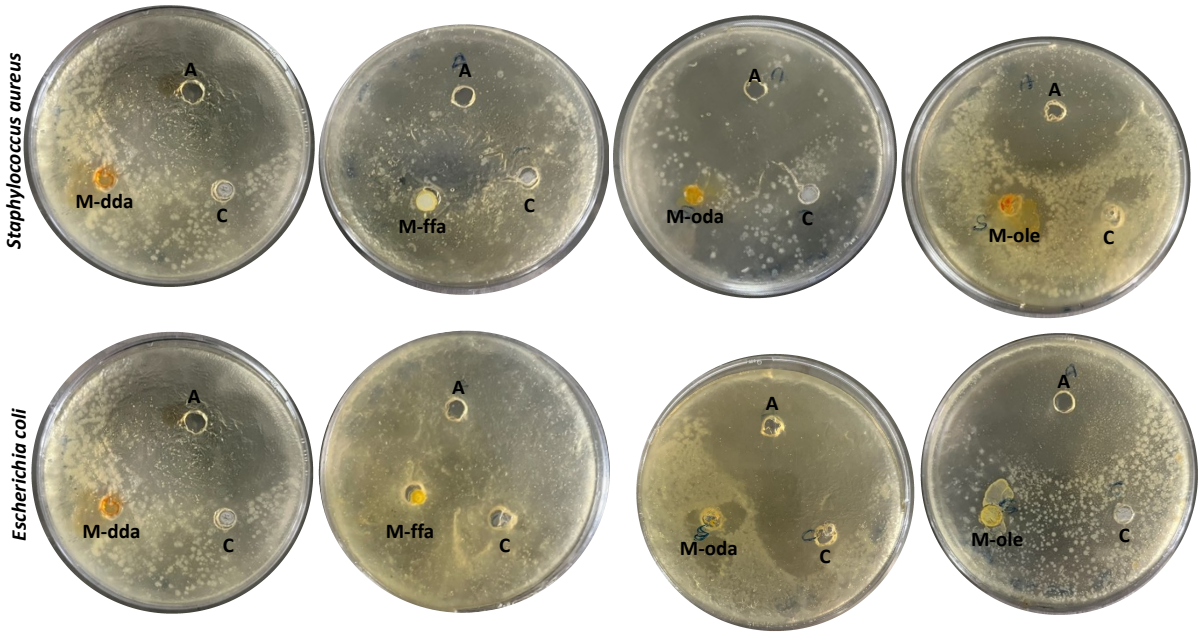


Fig. S1 Inhibition zone of magnolol based benzoxazines.

Table S1. Inhibition zone of magnolol based benzoxazines

Benzoxazine Sample (1 mg/ml)	Zone of inhibition (mm)	
	Staphylococcus aureus	*Escherichia coli*
M-dda	15	10
M-ffa	7	10
M-oda	25	20
M-ole	11	9