Sustainable approach to the antifouling and corrosion inhibitive properties of Exopolysaccharide producing *Rhizobium leguminosarum* (Legume Root Nodule Associated Bacteria) on mild steel at low pH

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Rhizobium leguminosarum is isolated from legume root nodule of *Vigna mungo* and screened for exopolysaccharide production along with biofilm forming ability by bacterial attachment assay. The *Rhizobium leguminosarum* isolate is utilized for its anti-fouling potential against the fouling isolates like *Bacillus sp.* and explored as corrosion inhibitor between 293 K and 313 K temperatures at low pH. Adsorption isotherm models, electrochemical techniques (EIS and PPM), XRD, spectroscopic (UV-Vis and FT-IR) and surface morphological studies (FE-SEM - EDX and AFM) have confirmed the adherence and anticorrosive nature of *Rhizobium leguminosarum* isolate. Maximum at 298 K with the optimum concentration of 9×10^6 cfu/mL *Rhizobium leguminosarum* isolate explored its potential. Increase in concentration of *Rhizobium leguminosarum* isolate enhanced the charge transfer resistance. Polarization curves indicate the mixed type inhibiting property of *Rhizobium leguminosarum* isolate.

Keyword: Electrochemical properties, *Rhizobium leguminosarum* isolate, Nodule associated bacteria, Exopolysaccharide, Antifouling, Corrosion inhibition

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