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Anti-biofilm activity of citrate intercalated layered double hydroxide against selected biofilm forming uropathogens

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Background & Aim: Citrate is one of promising anti-biofilm forming agents use to prevent biofilm formation as a catheter lock solution and as an oral intake. However, maintaining concentration of citrate for a long period of time will be beneficial in order to design a prolonged treatment. This study focused to determine the inhibitory effect of citrate intercalated Mg and Al layered double hydroxides (citrate-LDH) as a slow releasing agent against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Enterococcus faecalis*.

Methodology: The influence of citrate-LDH synthesized by one step co-precipitation reaction was investigated against mono- and co-cultures of *P. aeruginosa*, *S. aureus* and *E. faecalis* grown in brain heart infusion broth. The inhibitory effect and the minimum inhibitory concentration (MIC) were determined using agar well diffusion method and pour plate method, respectively. The minimum biofilm inhibitory concentration (MBIC) and the minimum killing time for 48 hours matured biofilms were determined by MTT viability assay.

Results & Discussion: For all tested strains, the MIC value of citrate-LDH was 1×10^{-5} g/mL while the MBIC value was 0.01 g/mL for an average 70% reduction and 0.10 g/mL for an average 98% reduction. The minimum killing time was 6 hours for MBIC70 and it was constant for all 48 hours confirming the slow releasing ability of citrate from LDH nanohybrid. The scanning electron microscopic images reveal the biofilm inhibitory effect of citrate-LDH as it has reduced the population of microorganism and extracellular polysaccharide matrix considerably compared to the control.

Conclusion: Thus, citrate-LDH has a sustainable biofilm reducible activity against tested uropathogens which will be a potential future anti-biofilm agent in treating urinary tract infections.

Biography

Buddhika Gayani is currently an MPhil student of Physical Chemistry at University of Sri Jayewardenepura, Sri Lanka. Her current research work explores nanomaterial solutions for potential anti-biofilm applications. In addition, she works on 3D printing of silicon based polymer materials. She holds BSc special degree in Chemistry from University of Sri Jayewardenepura, Sri Lanka. During her undergraduate research works, she has successfully used bamboo activated carbon for water purification applications.

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