

Quaternary Ammonium Silane- based Antimicrobial Triggers Biofilm Destruction and Cleaves MMPs.

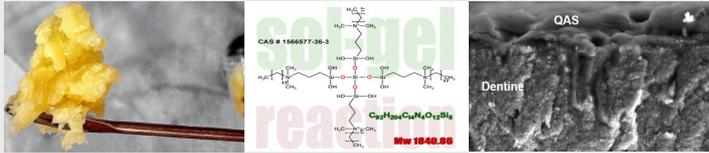
~ A Molecular Simulation Study ~

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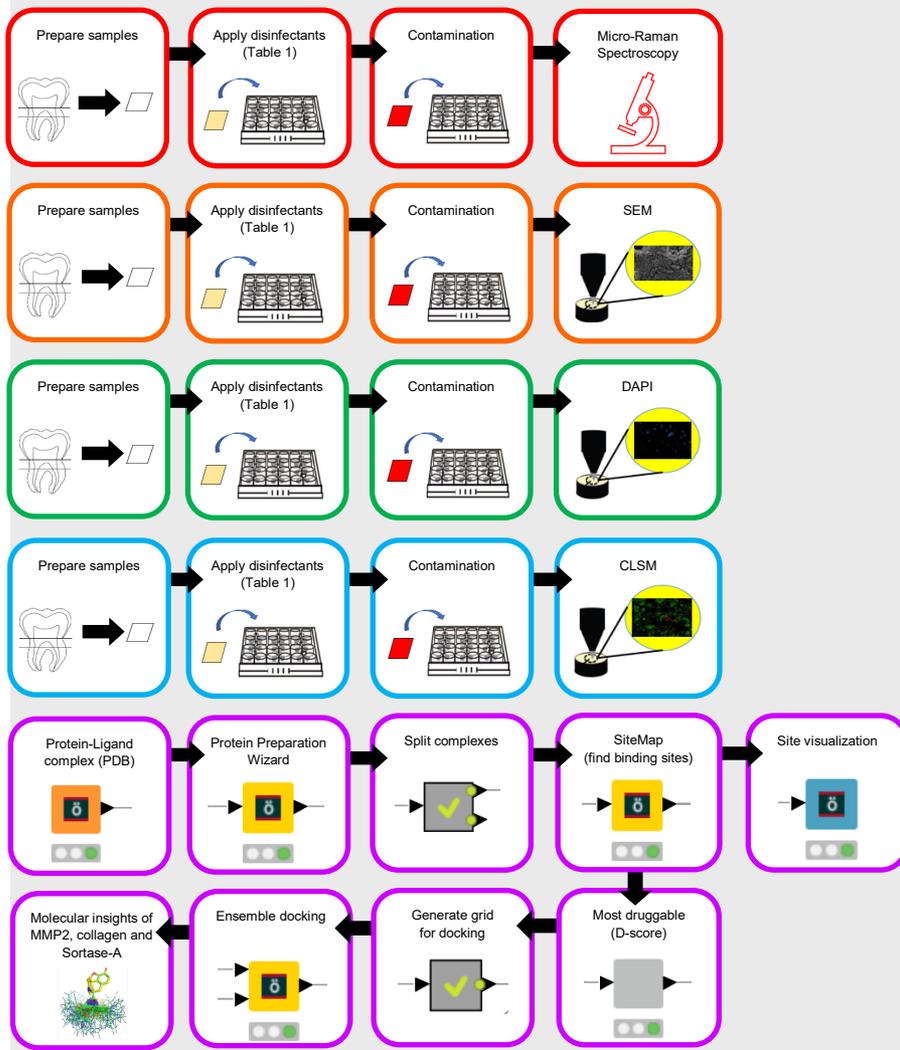
1. Background

K21, a new class of organosilane quaternary ammonium compound, is an organic contact killing agent with low cytotoxicity, broad spectrum antimicrobial activities and leaves behind an immobilized 3D amphiphilic network in the dentinal tubules for its substantivity.^[1,2] In this study, k21 was investigated for its potential against caries-forming bacteria.



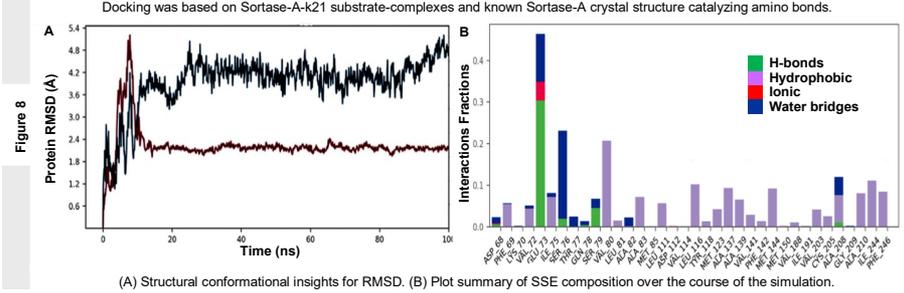
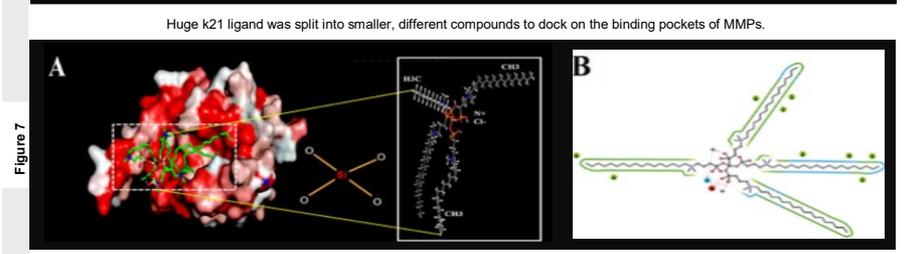
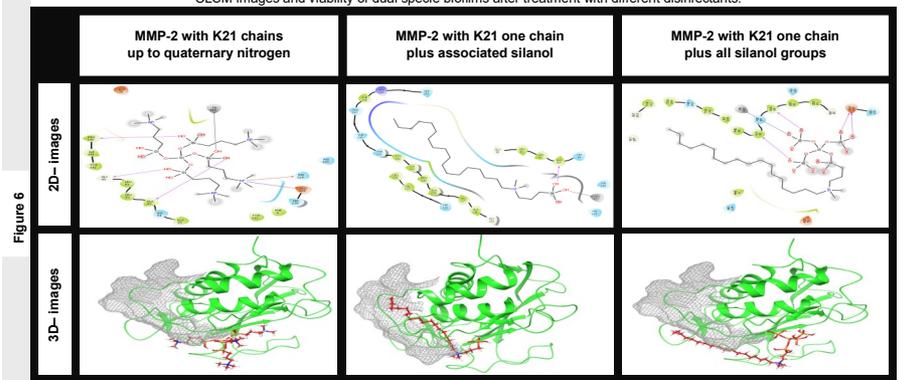
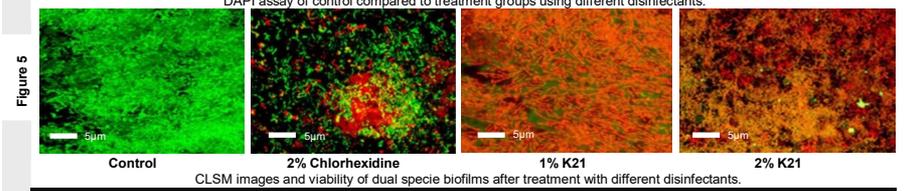
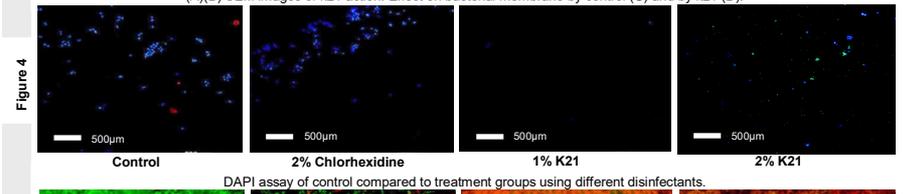
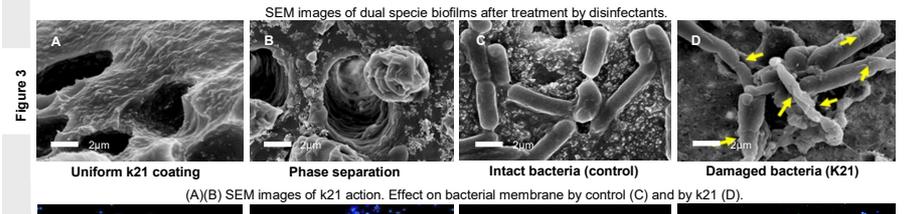
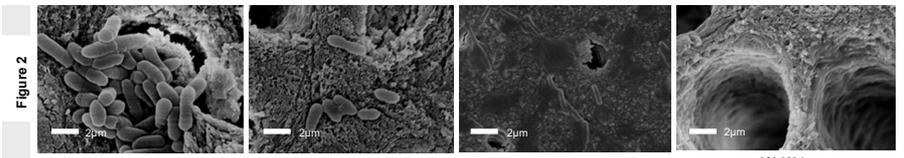
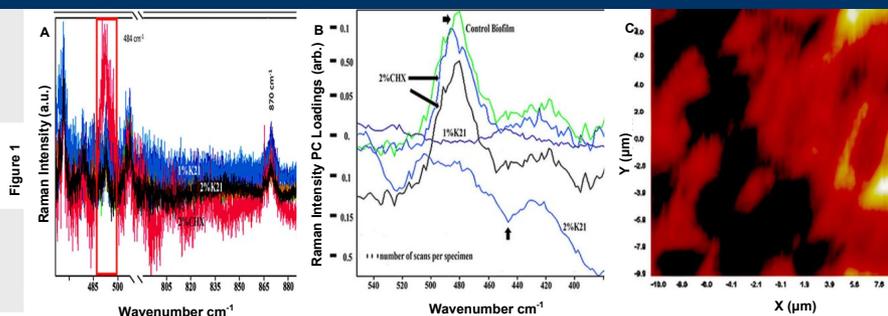
Aim: to study antimicrobial effects of quaternary ammonium silane (QAS/k21) exposure on *Streptococcus mutans* and *Lactobacillus acidophilus* bacterial biofilms at different concentrations.

2. Materials and Methods



Groups	MicroRaman Spectroscopy	SEM	DAPI	CLSM
	<i>Streptococcus mutans</i> & <i>Lactobacillus acidophilus</i>			
1	Saline	Saline	Saline	Saline
2	2% CHX	2% CHX	2% CHX	2% CHX
3	1% K21	1% K21	1% K21	1% K21
4	2% K21	2% K21	2% K21	2% K21

3. Results



4. Discussion

•K21 disinfectant is effective and ensures a significant decrease in microbial growth.
 •Significant destruction of bacterial membranes and understanding of the conformational changes of k21 towards MMP & Sortase-A attachment strongly correlates to the Raman vibrational and confocal changes.

5. Conclusion

Results of 1%k21 antimicrobial action suggest a greater potential for development of safer disinfectants and a biofilm inhibitor as compared to previous efficacy of 2% k21.

6. References

- Daood, U., Matinlinna, J.P., Pichika, M.R. A quaternary ammonium silane antimicrobial triggers bacterial membrane and biofilm destruction. *Sci Rep*, 2020.
- Daood, U.; Parolia, A.; Elkezza, A.; Yiu, C.K.; Abbott, P.; Matinlinna, J.P.; Fawzy, A.S. An in vitro study of a novel quaternary ammonium silane endodontic irrigant. *Dent. Mat.* 2019.