

Urethane-PDMS Derivative: Biomimetic Coatings for Ti-Al-V Alloy and SS 316L Surfaces for Biomedical Applications.

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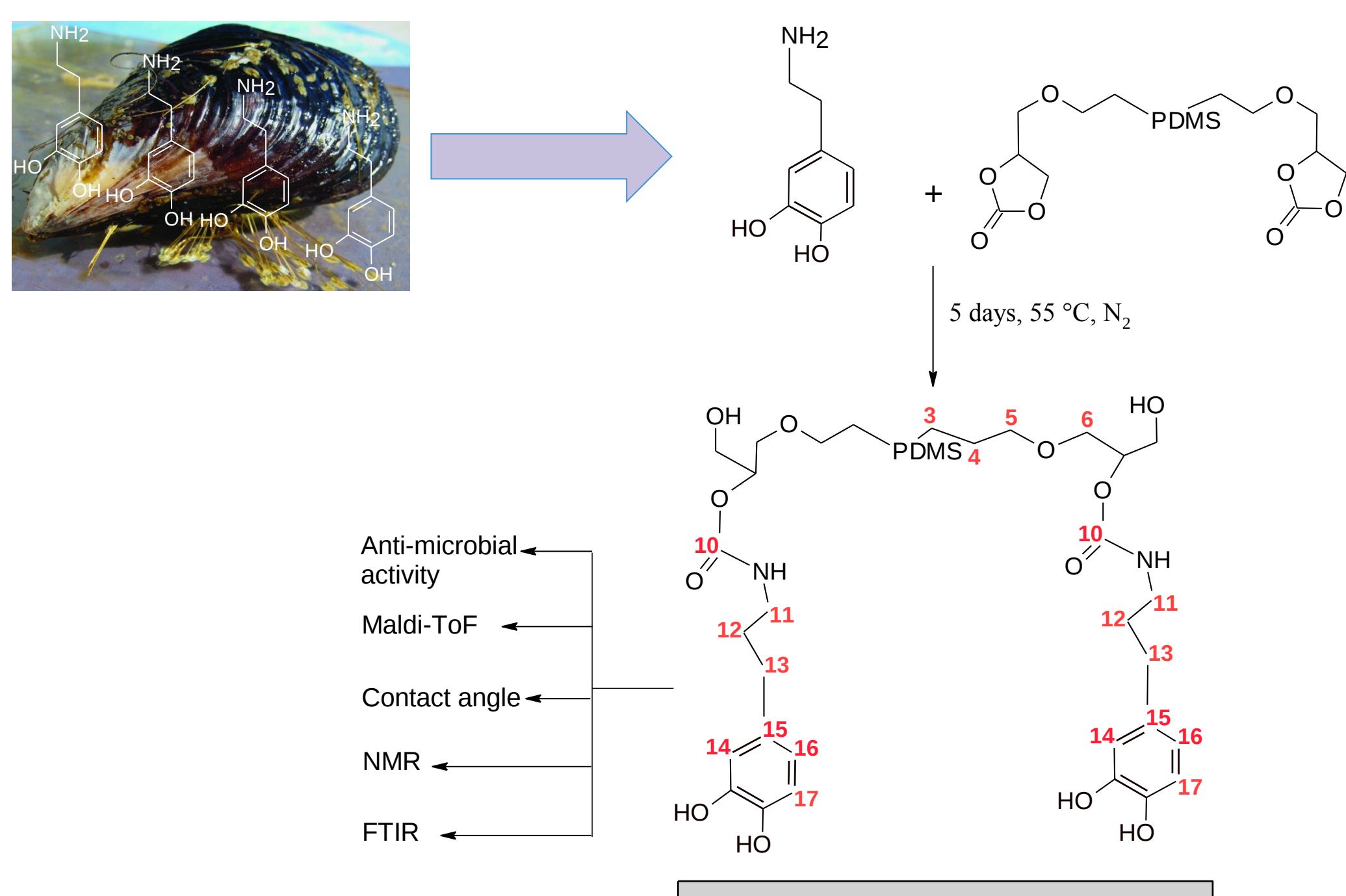
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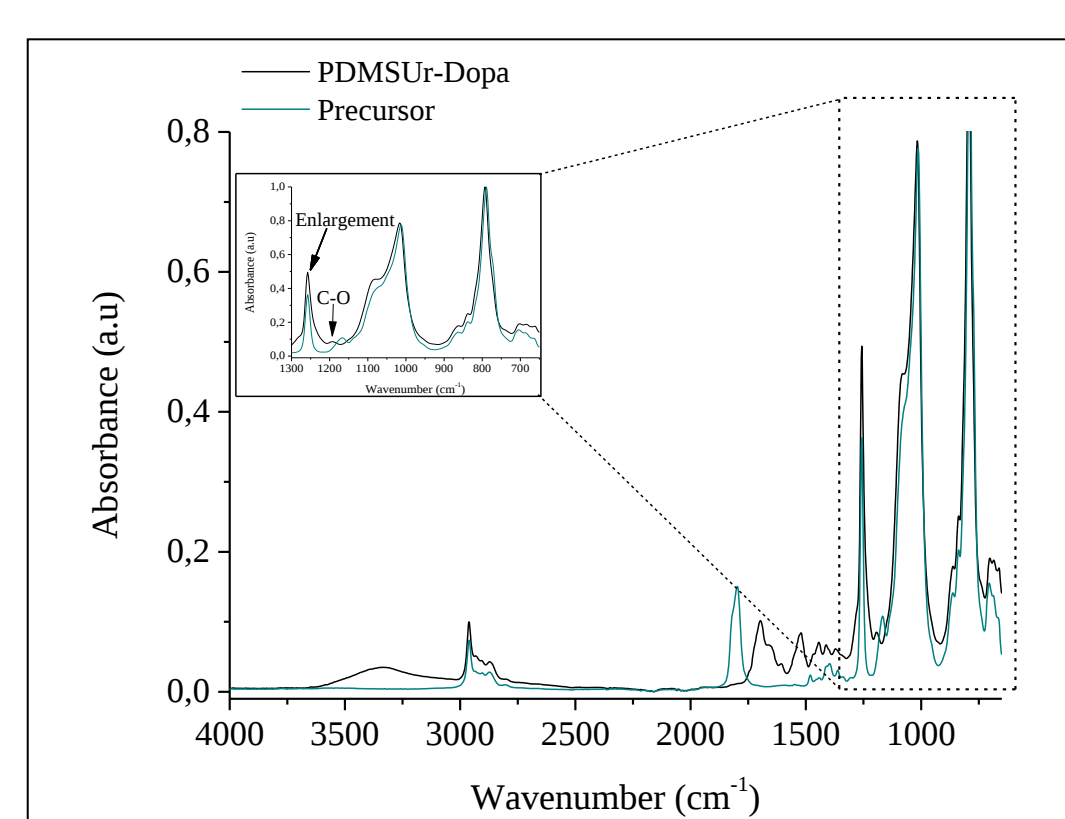
Introduction

This work proposed to synthesize biomimetic urethane-PDMS derivative (PDMSUr) which is potential candidate material to be applied as coating on titanium alloy and stainless steel for medical applications. Mainly due to the presence of catechol units, the PDMSUr has the ability to adhere on metallic surfaces. In mussels, catechol groups are responsible for its strong adhesion on different substrates. Catechol moieties can also provide a strong anti-bacterial behaviour as well as to increase the adhesive bond. We present here, the synthesis and characterization of PDMSUr containing dopamine (PDMSUr-D) and its microbiological activity against *E.coli* strain.

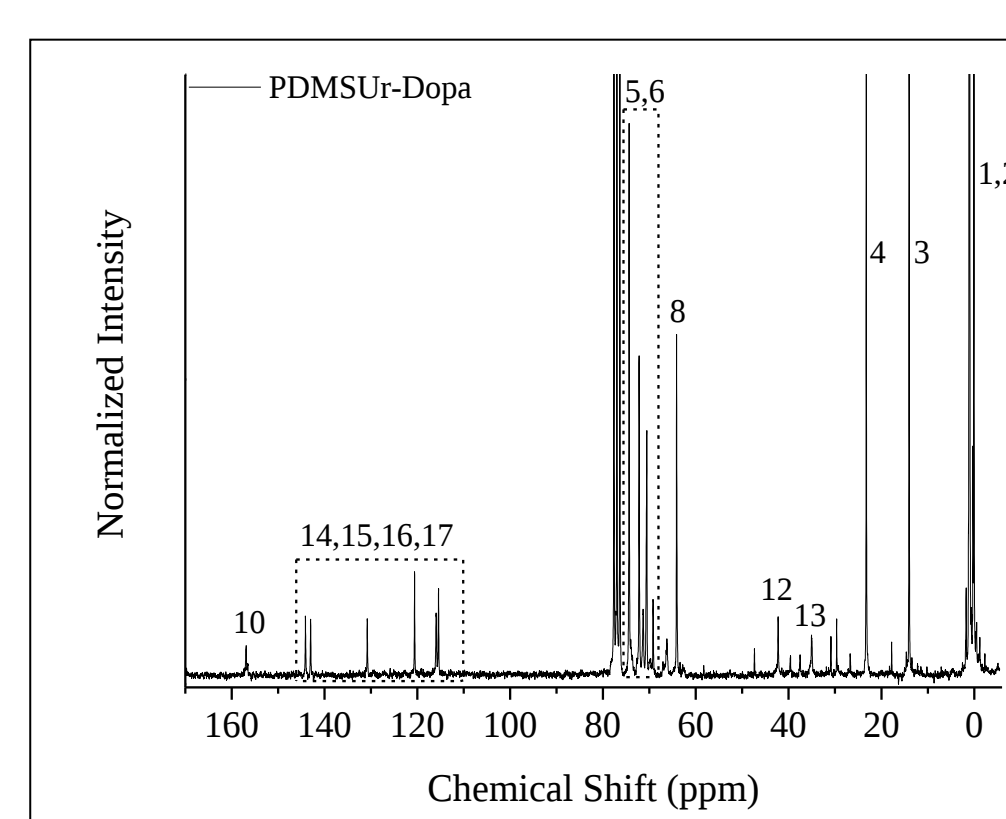
Experimental



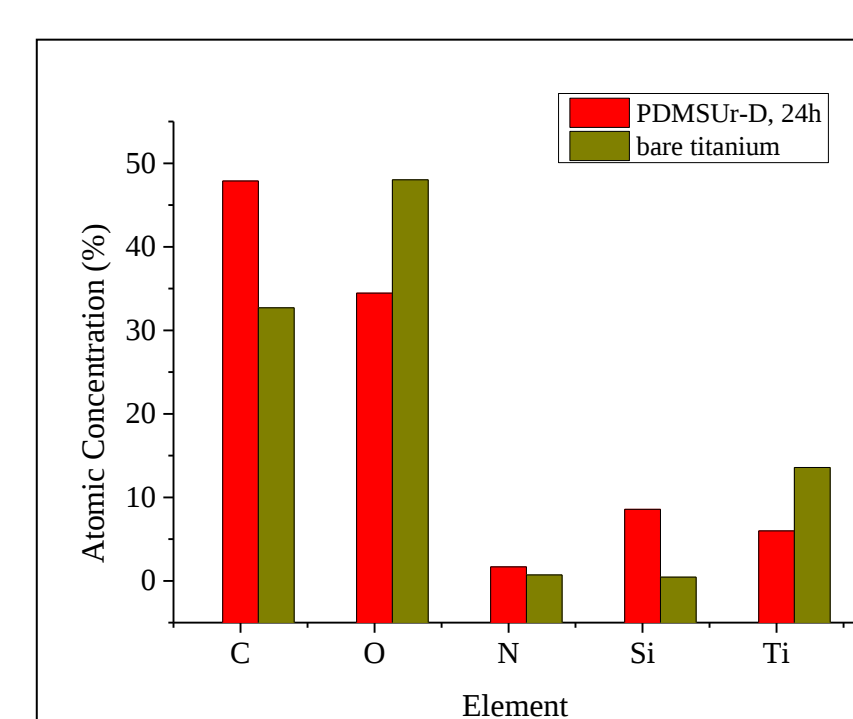
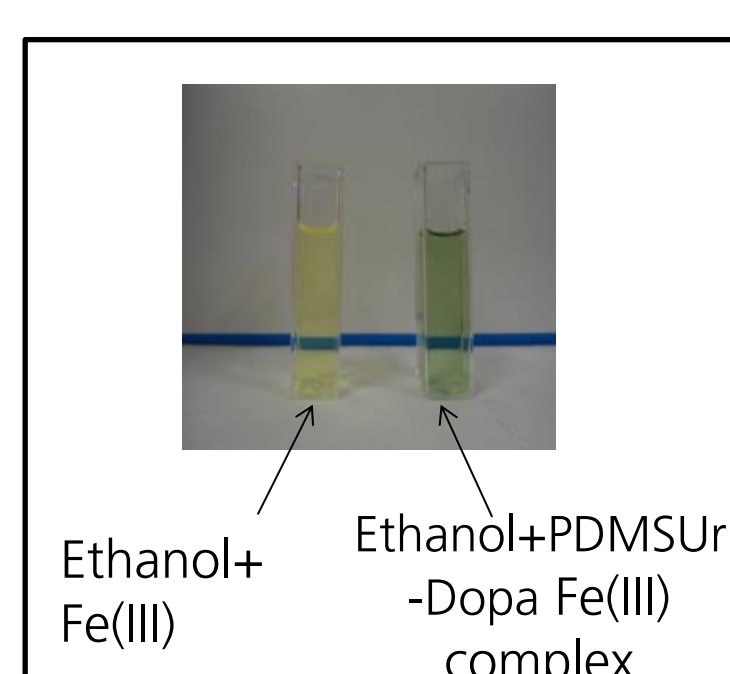
Results



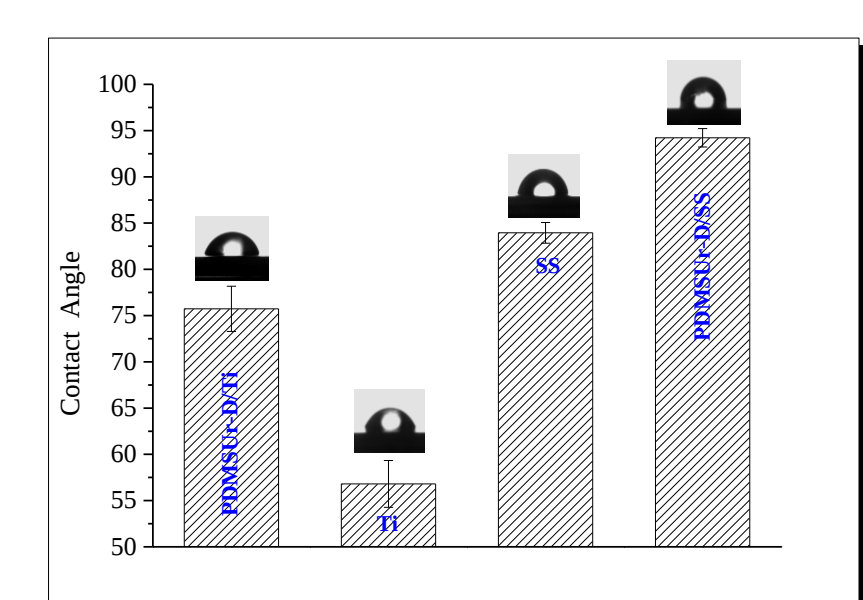
New bands: **3300 cm⁻¹** (OH, NH), **1191 cm⁻¹** (C-O stretching)



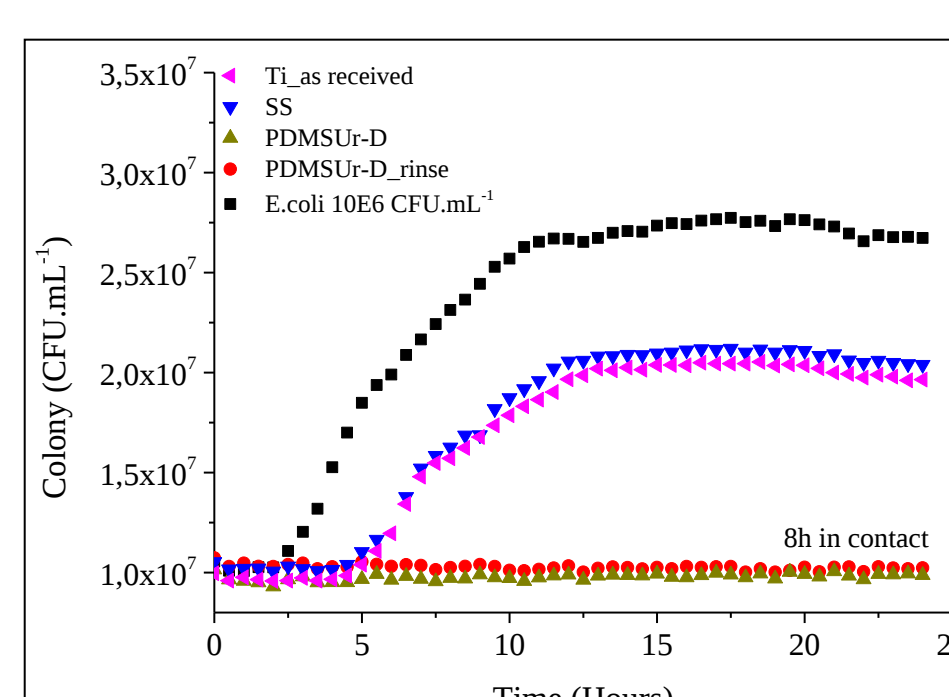
Typical C=O urethane signal at **156 ppm**.



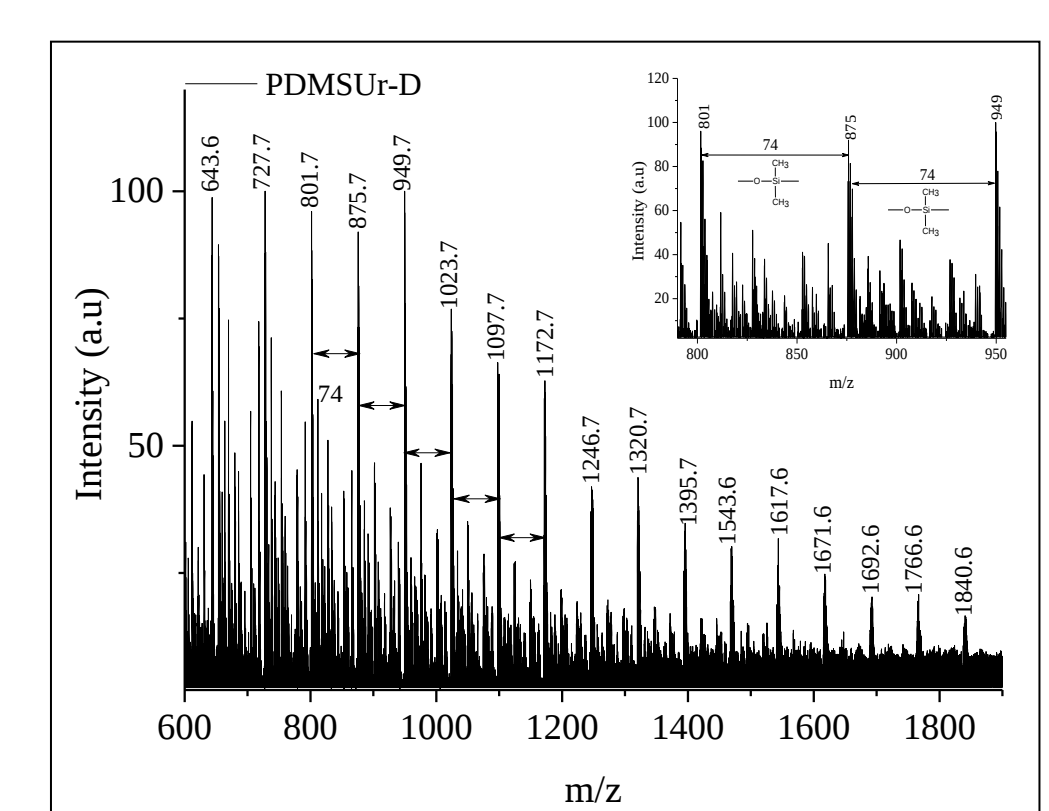
The at% Si has increased while at% Ti, decreased. It indicates that a thin layer (<10 nm) of PDMSUr-Dopa was deposited on top of the substrate.



Static contact angle of PDMSUr-d coatings.



E.coli strain after 8h in contact with PDMSUr-D avoided the growth on Ti and SS.



Protonated PDMSUr-D oligomers in the *m/z* 600-1900 range, *n* varying between 1-14. The *m/z* separation of 74 unit is consistent with dimethylsiloxane units.

Conclusions

A urethane containing dopa moieties was successfully obtained reacting dopamine and cyclic carbonate. Also, PDMSUr-D showed anti-bacterial properties against *E.coli* after 8h of contact. PDMSUr was able to modify metallic substrates, according to XPS results and contact angle.

References

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 [1] Sherman, M. A.; Kennedy, J. P.; Ely, D. L.; Smith, D. J. *Biomater.Sci., Polym.* 1999, 10, 259-269
 [2] Murphy, J. L.; Vollenweider, L.; Xu, F. and Lee, B. P. *Biomacromolecules*. 2010, 11, 2976-2984

Acknowledgments



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