

## Online Poster Competition - Winter Conference 2021

### Application Form

<b>Group</b> (Please delete as appropriate):	Dentist
<b>Category</b> (Please delete as appropriate):	Research
<b>Title of poster:</b>	Development of Adhesive Micro-Nano Fabricated Topographies for Dental Applications
<b>Author(s):</b>	Eda Dzinovic, MSc Student in Regenerative Dentistry at King's College London Dr Sherif Elsharkawy, Academic Clinical Lecturer in Prosthodontics at King's College London
<b>Abstract:</b>	<p><b>Background:</b> In nature, many organisms accommodate a complex living environment by developing mechanisms that enable fixation and predation. The perplexity of fixation and predation originate from highly ordered micro-and nanotopographies of living organisms. The idea of replicating naturally occurring topographies is part of the field that is known as biomimetics.</p> <p><b>Aim and standard(s):</b> Applying the biomimetics principles in dentistry, this project aims to generate adhesive topographies at the micro-and nanoscale levels to improve the retention of complete dentures in a turbulent oral environment. We hypothesized that the presence of hexagonal topographies might increase the retention of acrylic dentures and create a hydrophobic surface with remarkable anti-fouling properties. Towards this goal, we have optimized the fabrication of acrylic specimens with different hexagonal topographies.</p> <p><b>Methods/Process:</b> To validate our hypothesis, we firstly examined the wettability of acrylic specimens with topographies by measuring the contact angles. Secondly, we performed an adhesion test and evaluated the tensile bond strength (TBS) <i>in vitro</i>. Lastly, we quantified the formation of <i>Candida albicans</i> biofilm on acrylic specimens by performing colorimetric assays.</p> <p><b>Results:</b> Our finding is that all specimens with topographies demonstrated a hydrophobic surface. Despite the fact that specimens with topographies show hydrophobicity, the tensile bond strength was not increased. On the other hand, the adhesion of <i>Candida albicans</i> on acrylic specimens was higher in comparison to the negative control.</p> <p><b>Discussion:</b> The grooves between hexagons undoubtedly retain the liquid droplet on the apex of topographies and make the surface hydrophobic. Thus, all specimens with topographies induced a larger contact angle of a droplet in comparison to the flat surface. However, the presence of topographies did not improve the tensile bond strength. We also reported a higher adhesion of yeast cells on topographies. This might be impacted by the size of micro-grooves (5,10 and 25 <math>\mu\text{m}</math>) which allow the accumulation of smaller yeast cells (2 <math>\mu\text{m}</math>).</p> <p><b>Action and recommendations:</b> Biomimetics is a promising field that offers plenty of mechanisms and design inspirations. Further experiments under different conditions, with fewer limitations and improved tests, might elucidate our research question and provide answers to the results of this project. Overall, this laboratory work would help us to generate optimized designs towards the pursuit of fabricating the future generation of retentive complete dentures.</p>

Suggested headings to be used:

**Case study:**

Background  
Presenting problem  
Clinical details  
Clinical management  
Discussion  
Conclusion

**Audit / Research / Quality improvement:**

Background  
Aim and standard(s)  
*(if applicable)*  
Methods/Process  
Results  
Discussion  
Action and recommendations

**Please e-mail your application to : [poster@gerodontology.com](mailto:poster@gerodontology.com)**

**Closing date - Abstracts : Monday 1st November**  
**Closing date - e-poster : Monday 15th November**