

Development and application of underwater tissue adhesive using coacervated mussel adhesive protein

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The enormous demands of underwater adhesives are increasing in medical field. Minimally invasive procedure using tissue adhesive is being pursued to avoid complications from invasive procedures. However, one of the main problems of the conventional adhesives is the inability to reconnect or attach tissues in wet and highly dynamic environments within the body. Therefore, there have been many efforts to develop tissue adhesives that could be applied to wet substrates. It has been believed that these challenges might be overcome through seeking mechanisms of interfacial adhesion to wet saline surfaces of natural water-borne adhesives. Among many aquatic organisms, marine mussels secreting mussel adhesive proteins to affix themselves on marine substratum have attracted widespread scientific interest due to their intriguing properties. The impressive wet adhesions of MAPs can be expected to provide sufficient adhesion ability to tissue adhesive. In this research, aquatic organisms-inspired underwater tissue adhesives were developed for uses in various medical applications and applied to specific medical areas such as accelerating bone regeneration or managing urinary fistulas.