# Preparation of wound dressings with adhesion based on polyvinyl alcohol and tannic acid

# Introduction

Over the past years, hydrogels as wound dressings have been widely used in various types of epidermal damage. Compared with traditional wound dressings, hydrogel wound dressings have some advantages, such as high biocompatibility, anti-infection property, water vapor permeability and biodegradable property (Zhang D et al., 2005; Hong, K. H., & Sun, G., 2010). The unique properties of hydrogels are due to the three-dimensional and hydrophilic network between polymer chains, making hydrogels become an ideal wound dressing material. However, the current commercial hydrogel dressings need additional materials, such as thermosol, to adhere to the wound, which is cost-increasing and resource-wasting. Therefore, more attention should be paid to the development of hydrogel wound dressings with adhesion ability.

Polyvinyl alcohol (PVA) is a polymer obtained from polyvinyl acetate (PVAC) alcohol hydrolysis by high polymer chemical reaction, which has been widely used to prepare hydrogels due to its unique properties, such as nontoxicity, high hydrophilicity, mechanical resistance and biocompatibility (Kamoun, E. A. et al., 2015). Tannic acid (TA) is produced from gallnut plants with antimicrobial and antioxidant properties. TA can interact with biological macromolecules such as collagen, chitosan, gelatin and albumin through noncovalent interactions due to the multiple phenolic structures, which is crucial for anti-moisture adhesion (Li, J. et al., 2017; Sahiner, N. et al. 2016). Previous studies have prepared PVA-TA hydrogel wound dressings with excellent mechanical properties and shape memory behaviors (Hong, K. H., 2017; Chen, Y. N., et al. 2016). Daiheon Lee et al. develop a nontoxic underwater adhesive, VATA, based on PVA and TA (Lee, D. et al. 2020). However, several attempts have been made to the development of hydrogel wound dressings with adhesion ability based on PVA and TA.

Here, we used PVA124 to prepare hydrogel wound dressings with TA by freeze-thawing method and studied the effect of freeze-thawing circle times on the mechanical and adhesion properties of hydrogel. In particular, the PVA-TA hydrogel we developed in this study has moderate mechanical and good adhesion properties for the applications of wound dressings. The biocompatibility of the PVA-TA hydrogel should be further studied.