## Summary of the research work

### Development of a polysaccharide-based, *in-situ* forming, self-healing, ECM-mimetic scaffold to modulate cellular response for an enhanced wound healing

*In-situ* forming scaffolds could exhibit enhanced wound healing property due to their direct contact with the wound bed cells. Previous attempts for making *in-situ* wound healing scaffold involved chemical reactions, making them not suitable for clinical application. Also, complicated design makes their large-scale production very challenging [1-3]. In the present study, we have demonstrated that by electrostatic crosslinking, CH and CS solutions can form a crosslinked polymeric scaffold directly at the wound site, with no other chemicals or complicated modifications needed. This design simplicity is the most important feature of this scaffold. We have established a crosslinked scaffold formation by solid-state NMR, X-ray diffraction, and TGA analysis. The scaffold was found to have high viscoelastic property, with self-healing capability. Also the scaffold was found to be an effective carrier for the simvastatin drug loading. It also significantly improved keratinocyte and fibroblast proliferation and function. In the macrophage infected model it showed significant immunomodulatory effect on macrophages.In the rat skin-excisional wound model, treatment with the *in-situ* forming scaffold exhibited enhanced wound healing efficacy in terms of wound closure rate, collagen content, as well as α-SMA and β1-integrin expression. Altogether, this study demonstrated that mixing of CH and CS solution made a highly viscoelastic, porous scaffold, which can support epidermal and dermal cell proliferation and bio-function, with an enhanced *in-vivo* wound healing efficacy. The simplistic design strategy and easy preparation of this scaffold have substantial significance for possible clinical translation.

## References


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