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### Texture and rheological features of strain and pH sensitive chitosan-imine graphene-oxide composite hydrogel with fast self-healing nature

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#### Abstract

Here we report a smart Chitosan-isophthalaldehyde-Graphene oxide (CS-ISD-GO) hydrogel as a "multicomponent hydrogel". We witnessed an unprecedented pH responsive changes in viscoelasticity, stretchability, adhesiveness, self-healing and self-adaptability upon changing the pH and concentration of CS and ISD that was authenticated by texture and rheological analysis. The GO provides physical crosslinks and antibacterial properties to the hydrogel. Taking the advantage of dynamic nature of covalent and non-covalent interactions, we tuned the hydrogel adhesion and stretchability in response to the pH changes. Further self-healing of hydrogels was fully investigated by measuring thixotropic response over more than three cycles of strain sweep and real time optical imaging and video recording techniques. The recorded videos display 100% self-healing response within a time frame of 2-6min. These properties were observed only over small range of pH (4.5-5.5). The hydrogel becomes mechanically strong above pH5.5 and becomes unstable above pH7 leading to subsequent disintegration. The characterization of hydrogel was carried by FTIR, FESEM and TGA analysis. In addition, the hydrogel was reduced using NaBH<sub>4</sub> for drug release. The reduced gel appears to be stable at lower pH values also. The reduced hydrogel may potentially be used for drug release purpose with low toxicity.

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