# Biomolecule Responsive Supramolecular Hydrogel-Enzyme Hybrids

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Soft matters such as supramolecular hydrogels composed of self-assembled nanofibers exhibiting stimuli-response under aqueous conditions are attractive owing to their numerous potential bio-applications. However, installing macroscopic response toward structurally complex biochemical stimuli into them still remains a challenge. Here we show that redox-responsive peptide-based hydrogels[1] have the ability to encapsulate enzymes whilst retaining their activities and co-operative coupling of enzymatic reactions with the gel response allows us to construct unique stimuli responsive soft materials capable of sensing a variety of disease-related biomarkers. The programmable gel-sol response even to biological samples is visible to the naked eye. Furthermore, we built the Boolean logic gates, OR and AND gates into the hydrogel-enzyme hybrid materials, which were able to simultaneously sense plural specific biochemicals and execute a controlled drug release through the logical calculation.[2] The intelligent soft materials that we developed may prove valuable in future medical diagnostics or treatments.

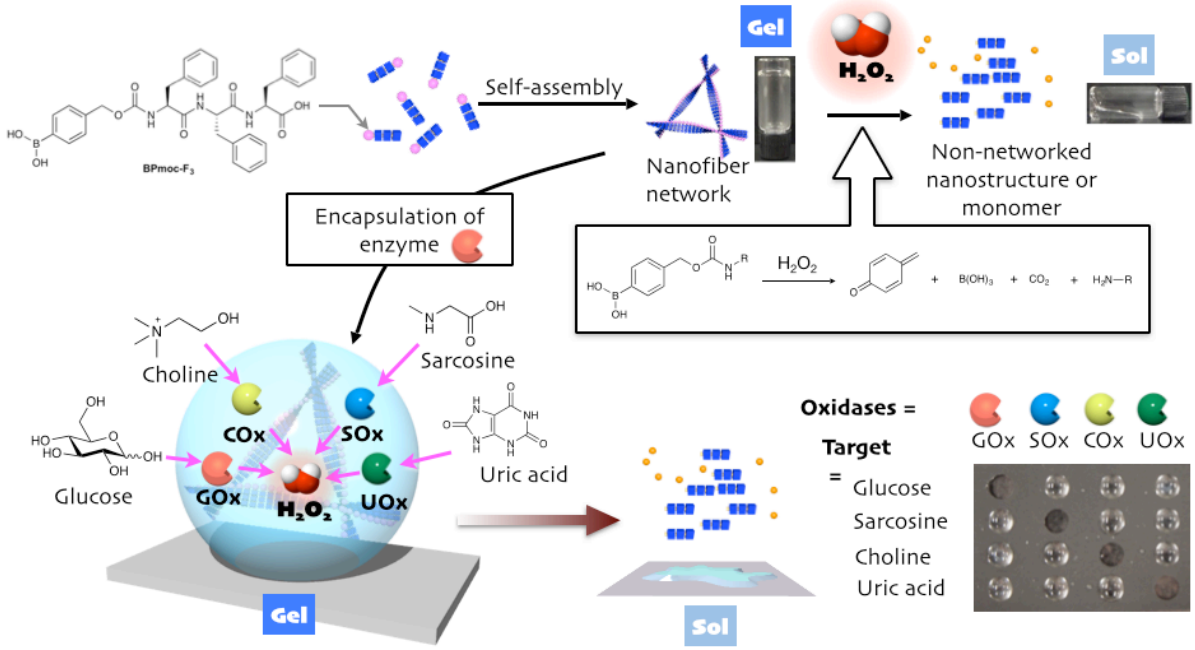


**Figure 1** | Schematic representation of Ox⊂BPmoc-$F_3$ hybrid gels. Information in the form of molecular input is received by enzyme (oxidases) and converted into $H_2O_2$, which eventually gives rise to gel-sol change as output through the degradation of matrix consisting of $H_2O_2$-responsive nanofiber.

## Reference

1. M. Ikeda, T. Tanida, T. Yoshii, I. Hamachi, *Adv. Mater.*, **2011**, *23*, 2819–2822.
2. M. Ikeda, T. Tanida, T. Yoshii, K. Kurotani, S. Onogi, K. Urayama, I. Hamachi, *Nat. Chem.*, **2014**, *6*, 511–518.