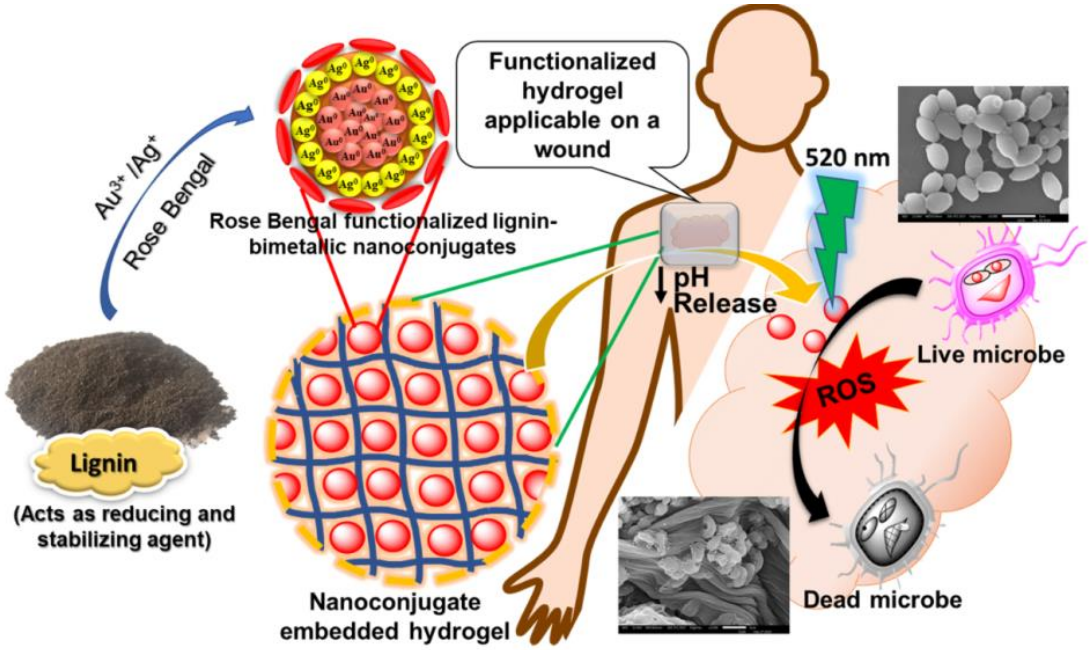
Development of agri-biomass derived lignin-bimetallic nanocomposite hydrogels with antimicrobial effects

Researchers at DBT's Center of Innovative and Applied Bioprocessing (DBT-CIAB), Mohali utilized agri-biomass derived lignin to synthesize silver-gold based photodynamic nanoconjugates. These nanoconjugates were used for the development of stable nanocomposite hydrogels. The developed hydrogels were tested for antimicrobial photodynamic efficacy and were found to perform complete microbial disinfection upon laser exposure. Interestingly, the team found that the developed antimicrobial hydrogels responded to micro-environmental pH and get activated only upon microbial exposure. This helps in pH triggered controlled release of the embedded nanoconjugates which in turn kills microbes.



Utilization of the developed hydrogels also assisted in better retention of nanoconjugates, sustaining their antimicrobial photodynamic efficacy for increased shelf life and long-term use. The developed hydrogels were also found to possess promising rheological as well transmittance properties. Simple and nontoxic methods were applied for the development of nanoconjugates and the corresponding hydrogels. All the aforementioned factors make the complete material to be scalable and cost-effective. The developed biocompatible nanocomposite hydrogels could be potentially applicable in controlled drug delivery, to develop antimicrobial nanocoatings as well as to construct wound dressings.

Recently emerging microbial infections and communal spread require rapid therapeutic as well as diagnostic solutions. Moreover, microbes are intense threat to human health. Fabrication of sustainable antimicrobial materials can be done using lignin, which is a naturally abundant polyphenol-rich biopolymer. This study has been recently published in the journal, *Biomacromolecules* published by American Chemical Society. (Impact Factor: 5.667, 2018)

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Contact details:

Chief Executive Officer (attn. Dt Jayeeta Bhaumik, Scientist-D)
DBT-Center of Innovative and Applied Bioprocessing (DBT-CIAB)
Knowledge City, Mohali 140306, Punjab, India
E-mail: ceo@ciab.res.in,
Phone 0172-522-1400