Supporting Information

Chromogenic sensor by ecdysis of Au@Ag nanorods assembled in hydrogel for selective ammonia vapors detection in food

Mahima Chandel,[1] Prem Singh,[2†] Kamaljit Kaur,[1†] Lalitya Chadalawada[1], T.S. Abhijith,[1] Keshav Bhardwaj[2], Amit Jaiswal[2]* and Vijayakumar Shanmugam[1]*

[1] Institute of Nano Science and Technology, Knowledge City, Sahibzada Ajit Singh Nagar, Punjab 140306, India;

[2] School of Biosciences and Bioengineering, Indian Institute of Technology Mandi, Kamand, Mandi 175005, Himachal Pradesh, India

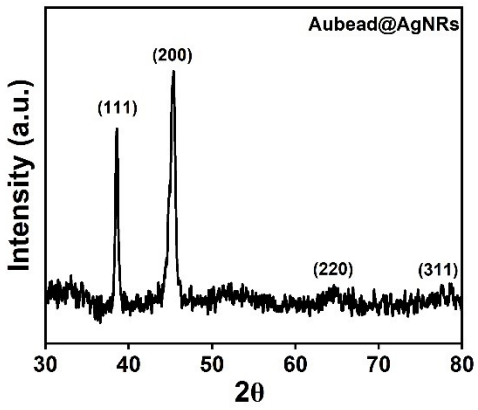


Fig. S1 XRD of Aubead@Ag nanorods

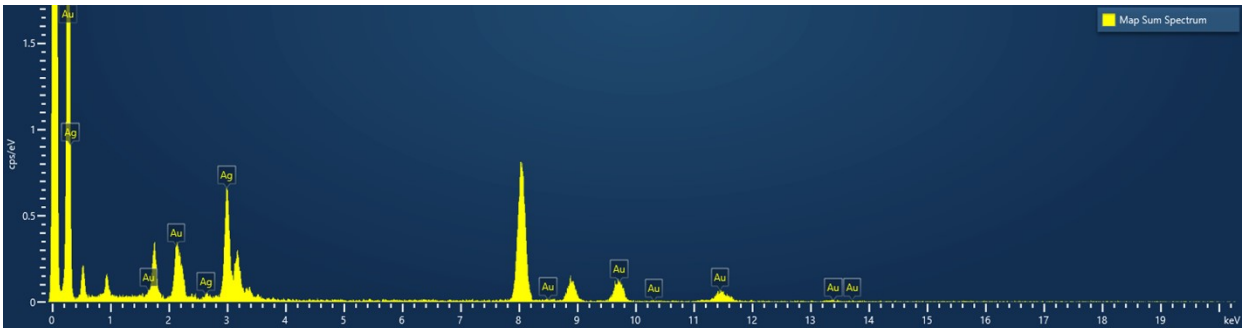


Fig. S2 EDX of Aubead@Ag nanorods

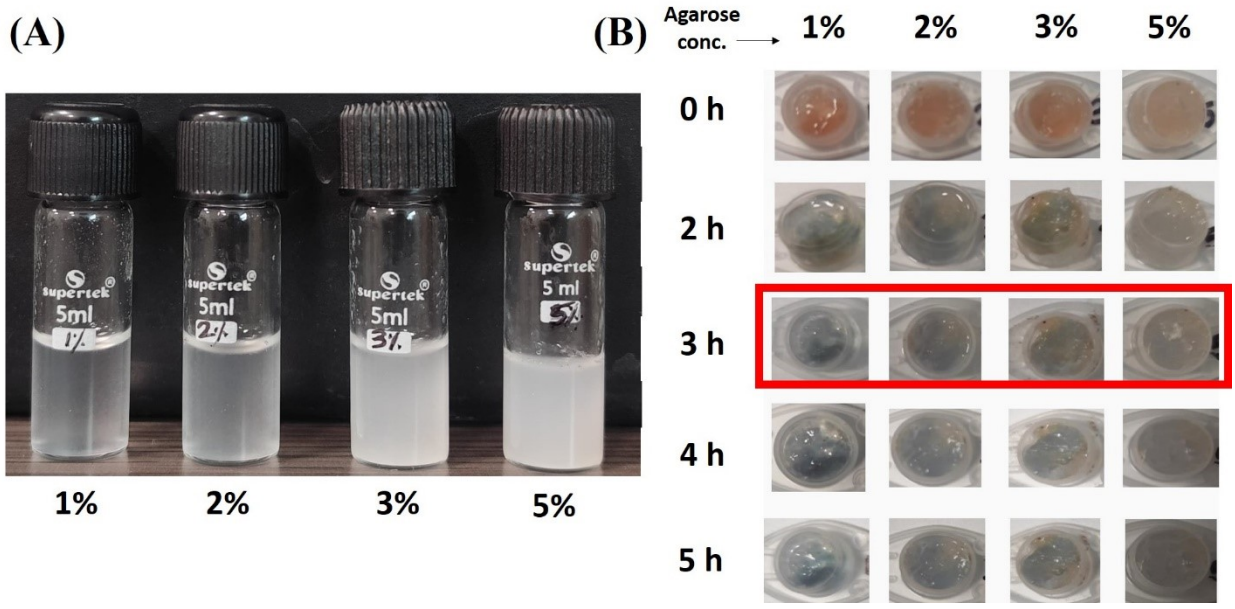


Fig. S3 (A) Hydrogel formation with different concentration of agarose (B) color change of hydrogel sensor after ammonia exposure with increase in agarose concentration at room temperature (25°C) and 40% humidity.

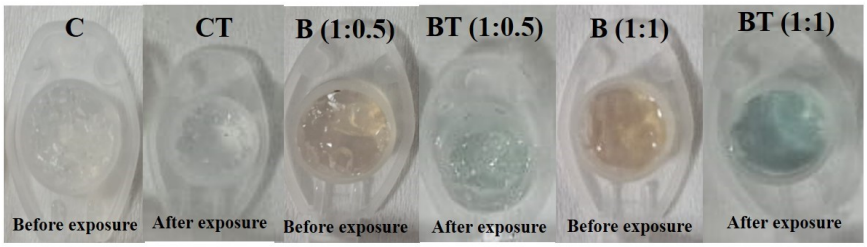


Fig. S4 Color contrast after addition of different volumes of Au-Bead@Ag nanorods inside agarose hydrogel at room temperature (25°C) and 40% humidity. Here C: control hydrogel i.e. agarose, CT: control agarose hydrogel exposed to ammonia vapors, B: control-agarose hydrogel with Au-Bead@Ag nanorods and BT: control-agarose hydrogel with Au-Bead@Ag nanorods exposed to ammonia vapors.

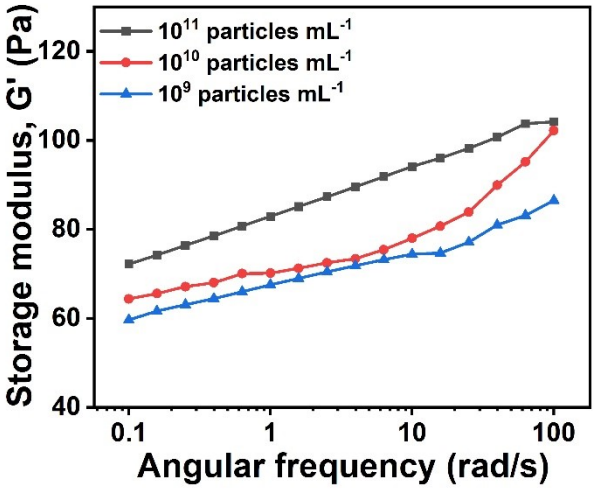


Fig. S5 Mechanical strength of hydrogel sensor after incorporation of different concentration of nanorods.

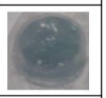
Time / Temp.	1 h	1h 30 min	3 h	5 h	24 h	48 h
-20° C						
4° C						
25° C						
35° C						
40° C						

Fig. S6 Effect of temperature on sensor response after exposure to ~13.4 M ammonia.

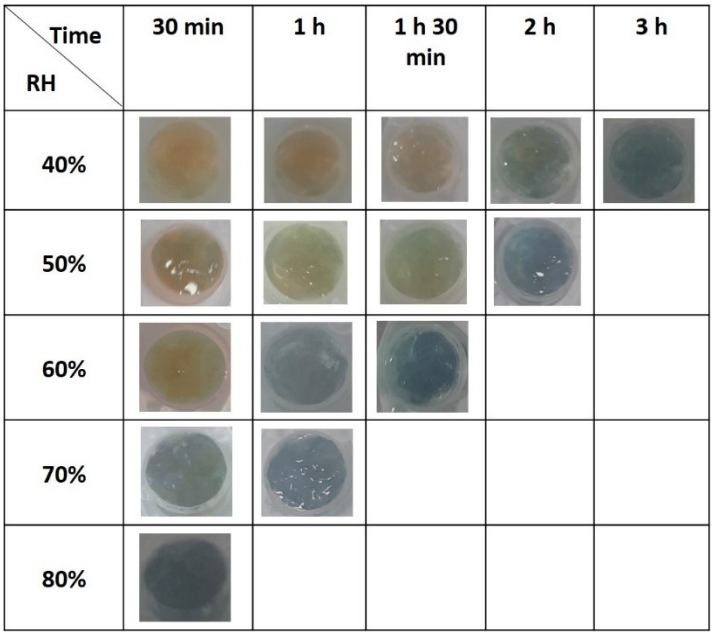


Fig. S7 Effect of humidity on sensor response at 25°C after exposure to ~13.4 M ammonia.

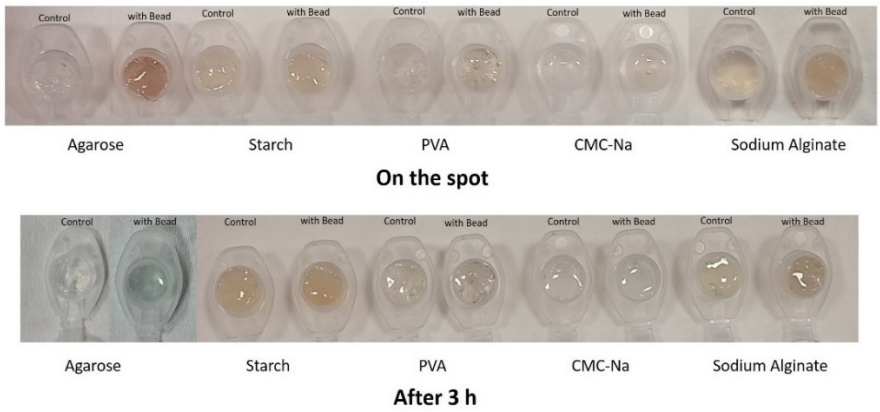


Fig. S8 Different gels exposed to ammonia at room temperature (25°C) and 40% humidity.

Table S1 pH change after ammonia exposure

S.No.	Sample Name	pH
1	Control (C)	8.3
2	Control + Treatment (CT)	12.8
3	Au-Bead@Ag Nanorods (B)	10.3
4	Au-Bead@Ag Nanorods + Ammonia Treatment (BT)	12.7

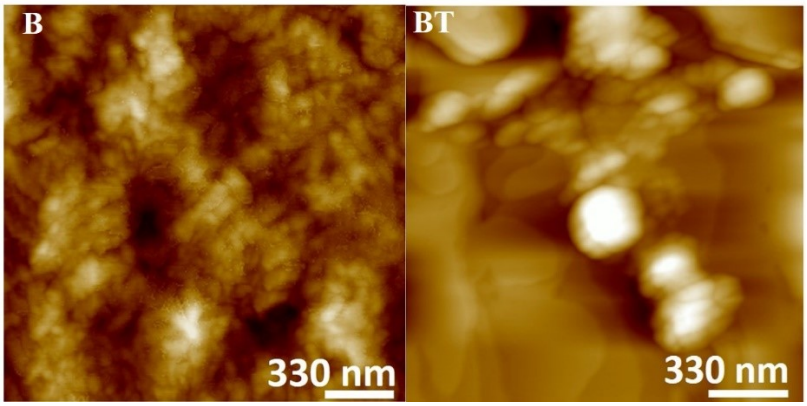


Fig. S9 AFM images of B: control-agarose hydrogel with Au-Bead@Ag nanorods and BT: control-agarose hydrogel with Au-Bead@Ag nanorods exposed to ammonia vapors.

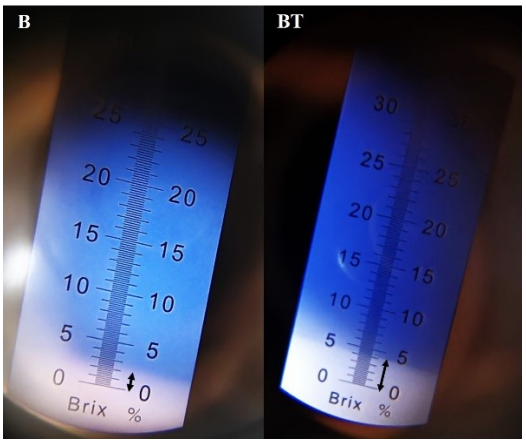


Fig. S10 Refractometer readings of hydrogel sensor before (B) and after ammonia exposure (BT).

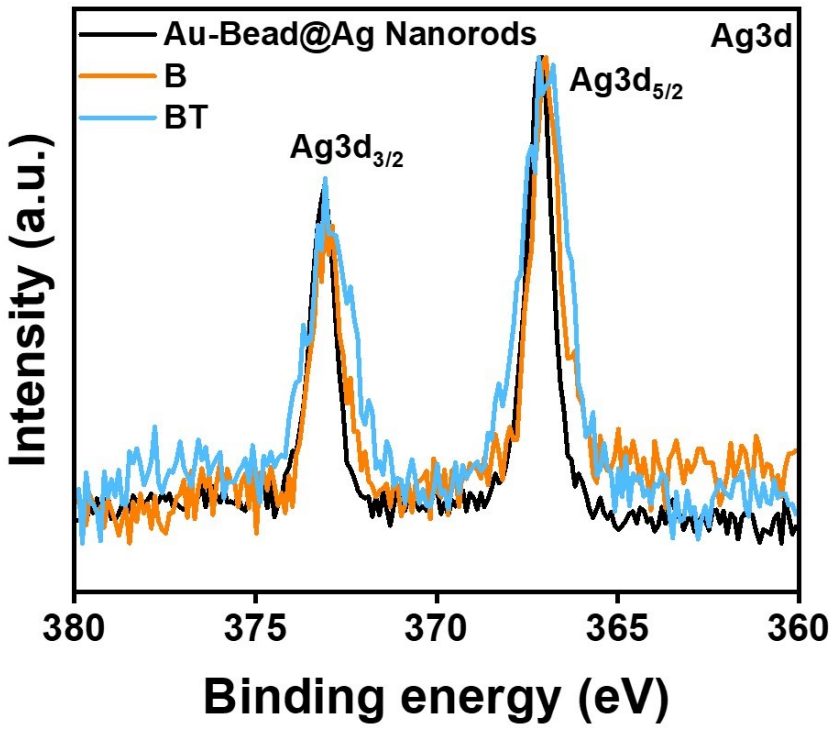


Fig. S11 Narrow scan of Ag of: Au-Bead@Ag nanorods, B: control-agarose hydrogel with Au-Bead@Ag nanorods and BT: control-agarose hydrogel with Au-Bead@Ag nanorods exposed to ammonia vapors.

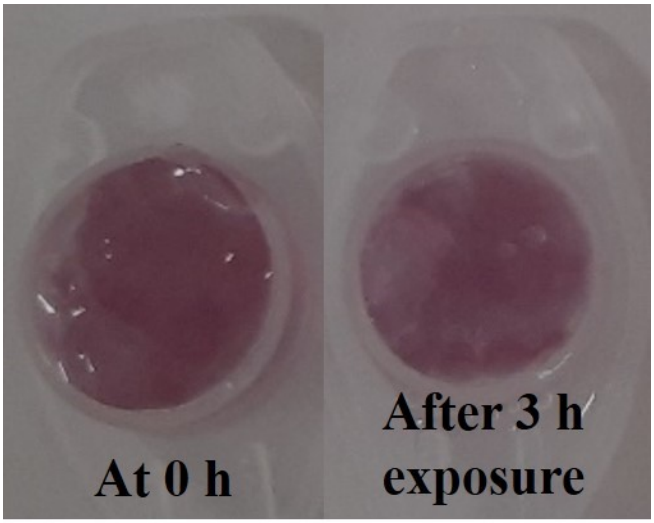


Fig. S12 Hydrogel sensor containing Au bead only before and after exposure of ammonia at room temperature (25°C) and 40% humidity.

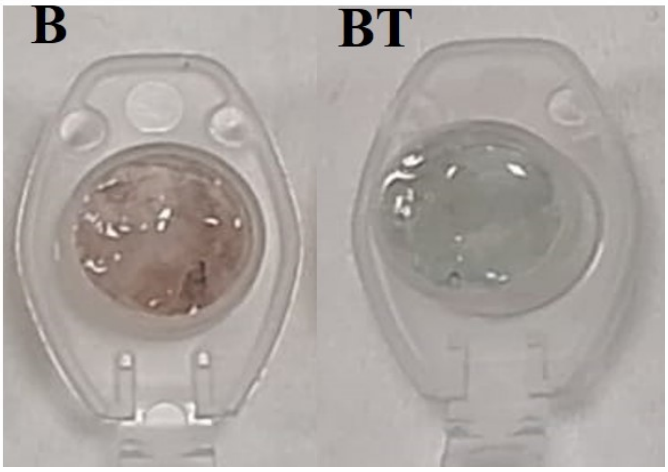


Fig. S13 Stability of hydrogel sensor by keeping it at room temperature for few days followed by testing its performance at room temperature (25°C) and 40% humidity.

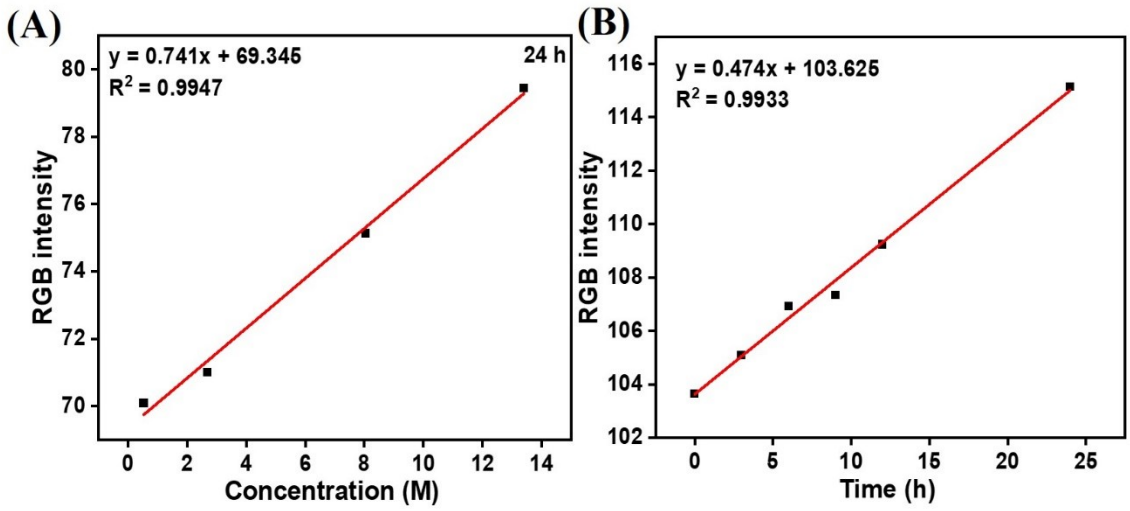


Fig. S14 Representative image of linear relationship of color change (RGB intensity) w.r.t. (A) increase in concentration (after 24 h of spiking ammonia) and (B) time (after spiking with 13.4 M concentration of ammonia in meat sample).

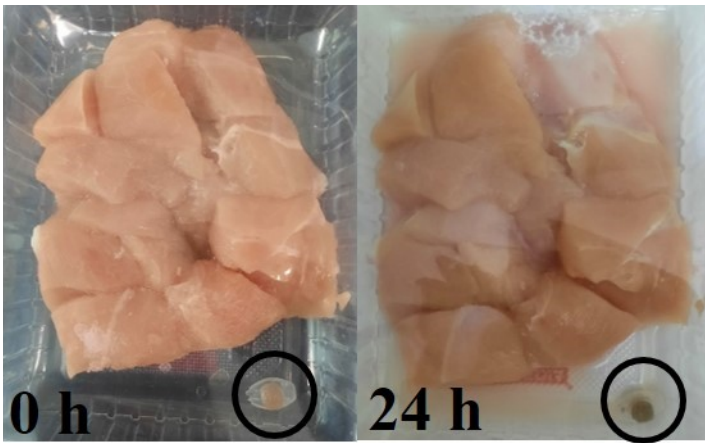


Fig. S15 Practicality of sensor in chicken sample at room temperature (25°C) and 40% humidity showing color change after 24 hours.