

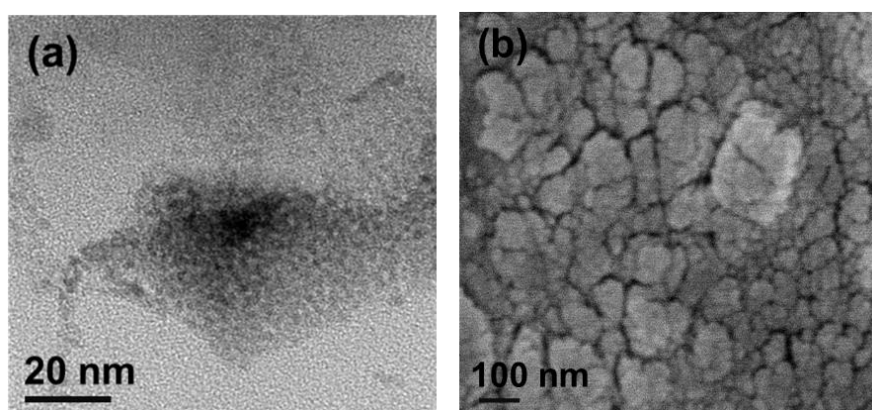
Supplementary Materials

# Reagent-Free Colorimetric Assay for Galactose Using Agarose Gel Entrapping Nanoceria and Galactose Oxidase

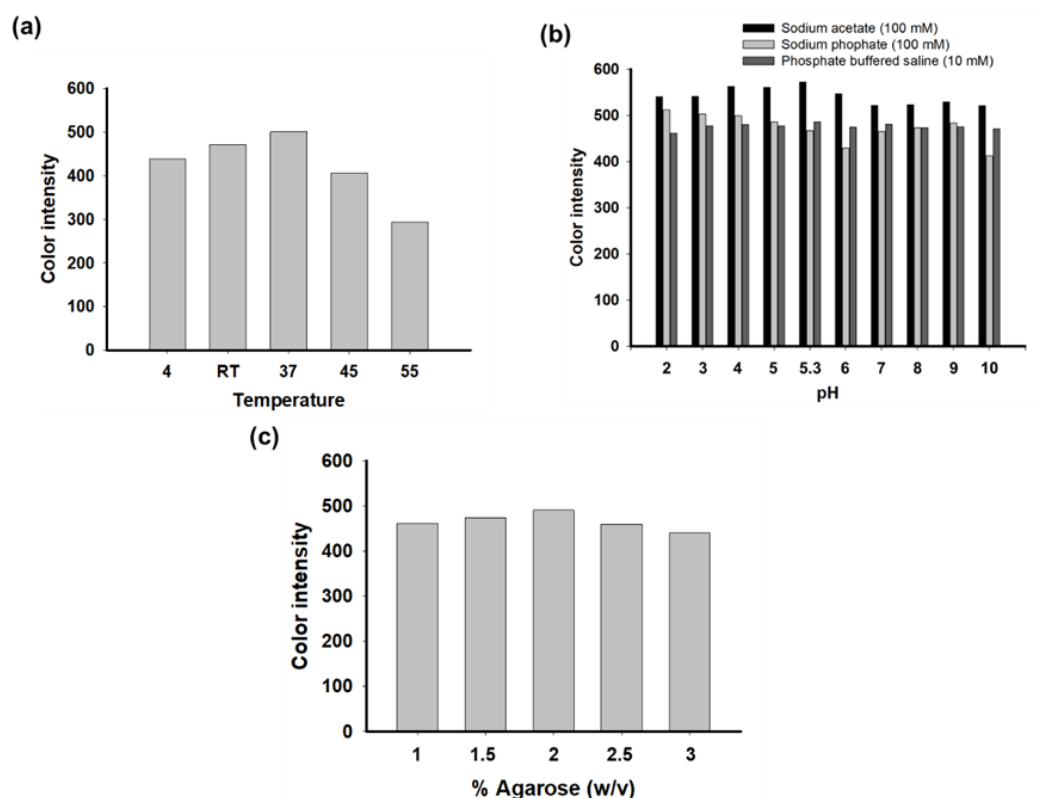
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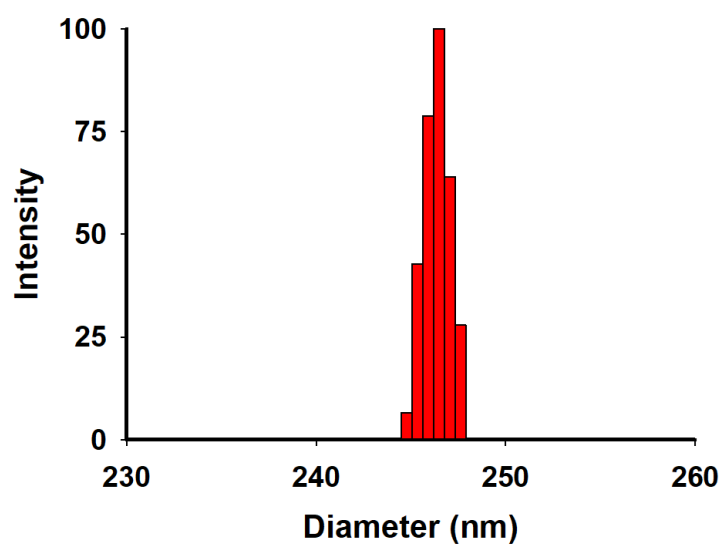
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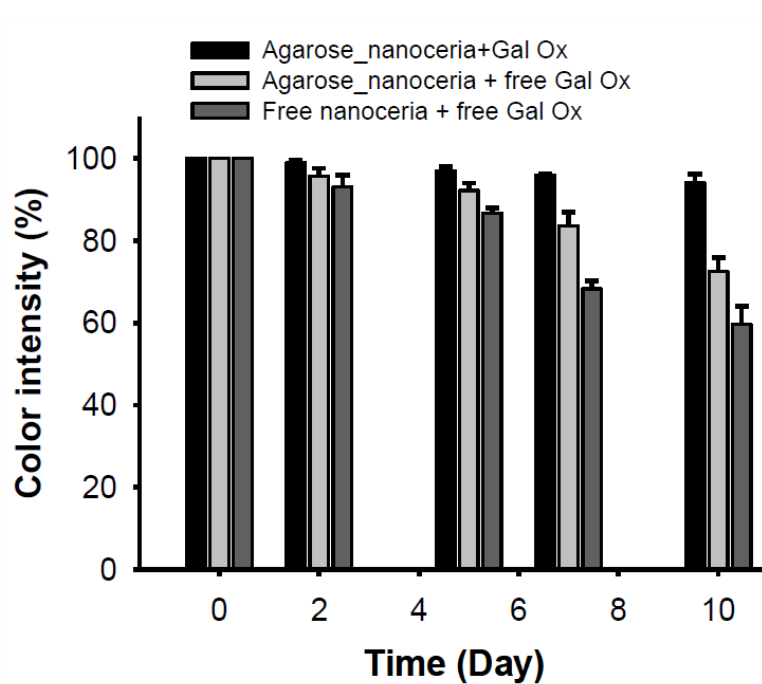
**Figure S1.** (a) TEM and (b) SEM images of agarose\_nanoceria.



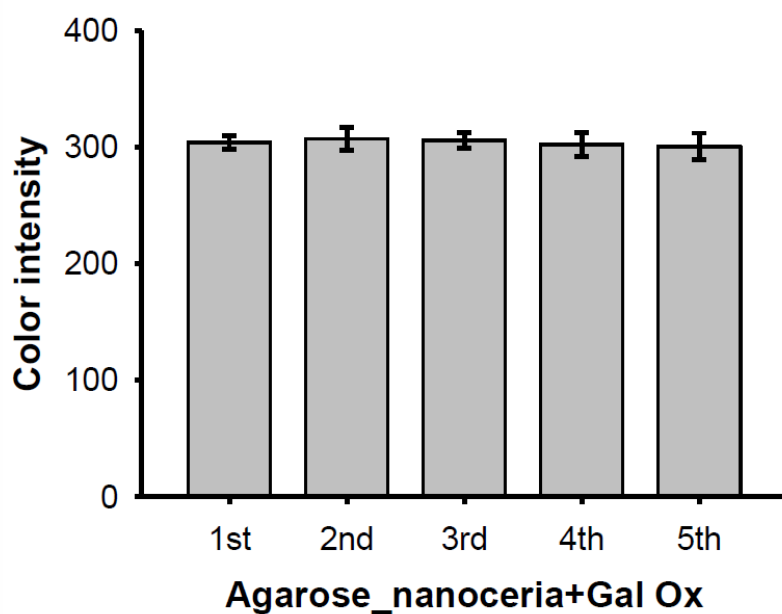
**Figure S2.** Effects of (a) temperature, (b) buffer system (pH and composition), and (c) gel density on the level of color intensity for the detection of  $H_2O_2$ .



**Figure S3.** Hydrodynamic size distributions of free nanoceria measured by DLS.



**Figure S4.** Stability of agarose\_nanoceria+Gal Ox and free Gal Ox in the presence of either agarose\_nanoceria or free nanoceria. Samples were incubated in aqueous buffer (100 mM sodium acetate, pH 5.3) at RT under static conditions and the error bars represent the standard deviation of three independent measurements.



**Figure S5.** Color intensity toward 10 mM galactose using agarose\_nanoceria+Gal Ox composites prepared from 5 different synthetic batches.

**Table S1.** An overview on the essential assay attributes of optical determination of galactose.

Required reagent	Detection method	Reaction time (h)	Linear range ( $\mu\text{M}$ )	LOD ( $\mu\text{M}$ )	Estimated cost	Stability	Ref.
Resazurin	Fluorescence	4	1-1000	5	High	Not tested	[S1]
Amplex UltraRed	Fluorescence	0.5	2-80	2	Medium	Not tested	[S2]
3,3',5,5'-tetramethylbenzidine (TMB)	Colorimetry	3	10-20,000	3	Low	Not tested	[S3]
2-(p-iodophenyl)-3-(p-nitrophenyl)-5-phenyltetrazolium chloride (INT)	Colorimetry	0.75	27.8-2780	27.8	Medium	Not tested	[S4]
2,20-Azino-bis(3-ethylbenzo-thiazoline-6-sulfonic acid) diammonium salt (ABTS)	Colorimetry	0.67	55.6-1111	27.8	Low	~20 days	[13]
Reagent-free	Colorimetry	0.5	100-1500	50	Low	~10 days	This work

## References

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- S3. Li, M.; Yang, J.; Ou, Y.; Shi, Y.; Liu, L.; Sun, C.; Zheng, H.; Long, Y. Peroxidase-like activity of 2',7'-difluorofluorescein and its application for galactose detection. *Talanta* **2018**, *182*, 422–427.
- S4. Kianmehr, A.; Mahrooz, A.; Ansari, J.; Oladnabi, M.; Shahbazmohammadi, H. The rapid and sensitive quantitative determination of galactose by combined enzymatic and colorimetric method: application in neonatal screening. *Appl. Biochem. Biotechnol.* **2016**, *179*, 283–293.



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