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Gold Nanoparticle Colorants as Traditional Ceramic Glaze Alternatives†

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► **Figure S1**: Sample tile coated in a Cu(I) doped glaze and fired in an electric kiln and oxidative atmosphere to produce Cu(II) oxide glaze

► **Figure S2**: Sample tiles with glazes doped with different concentrations of gold nanoparticles with and without opacifier (SnO_2) and fired in an oxidative environment.

►**Figure S3**: UV-Vis reflectance spectra comparing 0.1 % AuNP glazes from a reductive firing environment with and without SnO_2.

►**Figure S4**: Surface plasmon comparison of UV-Vis reflectance spectra from 0.1% AuNP glazed ceramics fired in both oxidative and reductive atmospheres.

►**Figure S5**: UV-Vis spectra from leaching experiment where aliquots of a 5% acetic acid solutions in contact with AuNP glazed mugs for 192 hours were tested for a surface plasmon band indicative of AuNP leaching.

►**Figure S6**: Standard gold calibration curve as measured on a graphite-furnace atomic absorption spectrophotometer (GF-AAS) and the absorbance measurements of aliquots taken from the 5% acetic acid solution in contact with the AuNP glazed mugs over the course of 192 hours in order to assess gold leaching (Data in tabular form, **Table S1**).

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† Patent pending.

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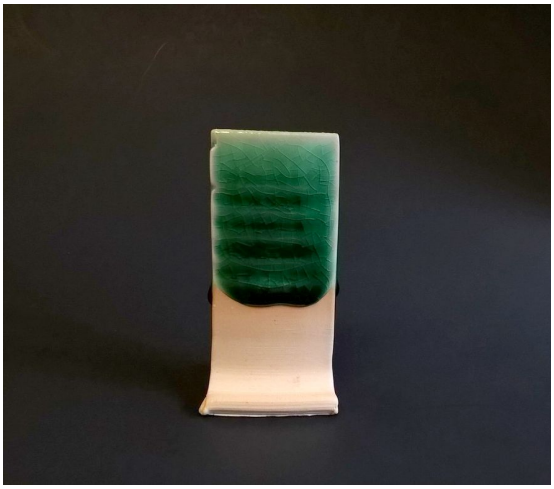

Figure S1. Sample of red copper (I) oxide glaze tile fired in an electric, oxidation firing. The fired tile came out vibrant green after firing, which is synonymous with copper (II) oxide glazes and supports the presence of an oxidation atmosphere.

Figure S2. Oxidation-fired gold nanoparticle oxidation tiles. From left to right, 0.015, 0.050, and 0.100 % (wt/wt) Au without tin oxide and and 0.015, 0.050, and 0.100 % (wt/wt) Au with 4% tin oxide.

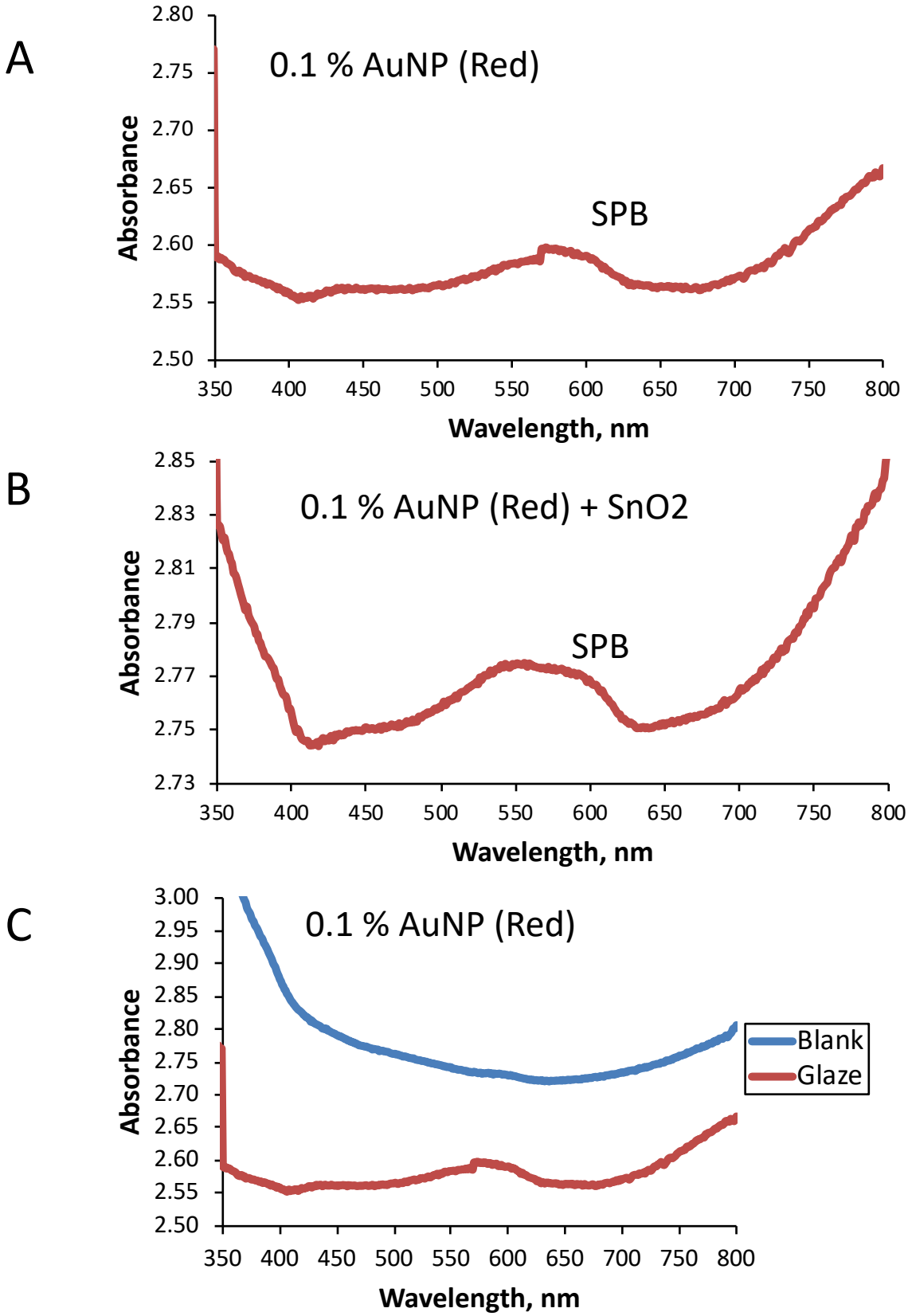

Figure S3. UV-Vis relectance spectra of 0.1% Au-NP glazed ceramic from a reductive firing environment with **(A)** 0% and **(B)** 4% tin oxide; **(C)** spectral comparison of unglazed ceramic lacking a SPB to sample shown in (A). Note: SPB indicating the presence of Au-NPs are slightly red-shifted from solution (Fig. 1) due to some partial aggregation of particles.

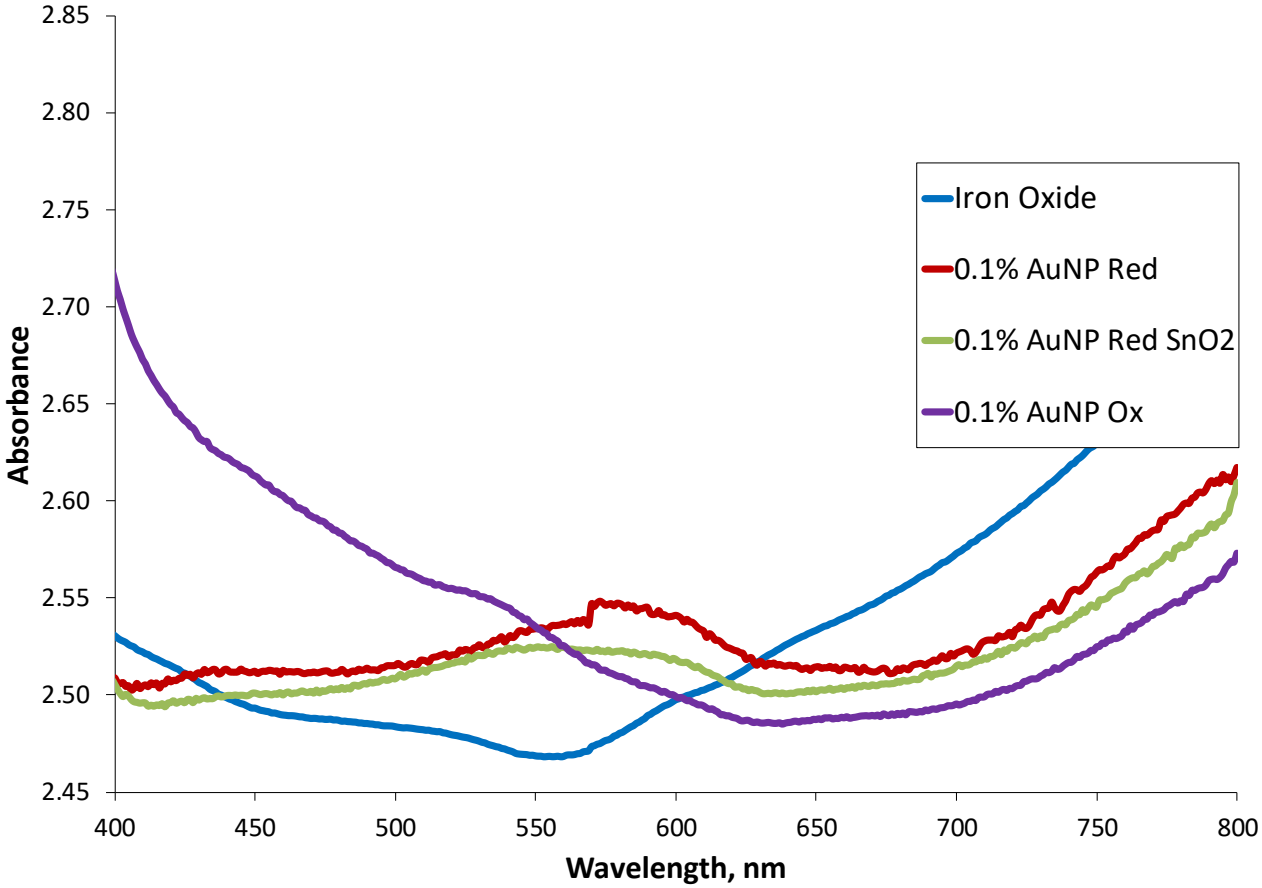

Figure S4. UV-Vis relectance spectra comparison of 0.1% Au-NP glazed ceramics with and without SnO2 and fired in a reductive environment compared with a sample fired in an oxidative environment. The reflectance spectrum of a ceramic colored with a traditional glaze (Fe_2O_3, Fig. 2) is also shown for comparison.

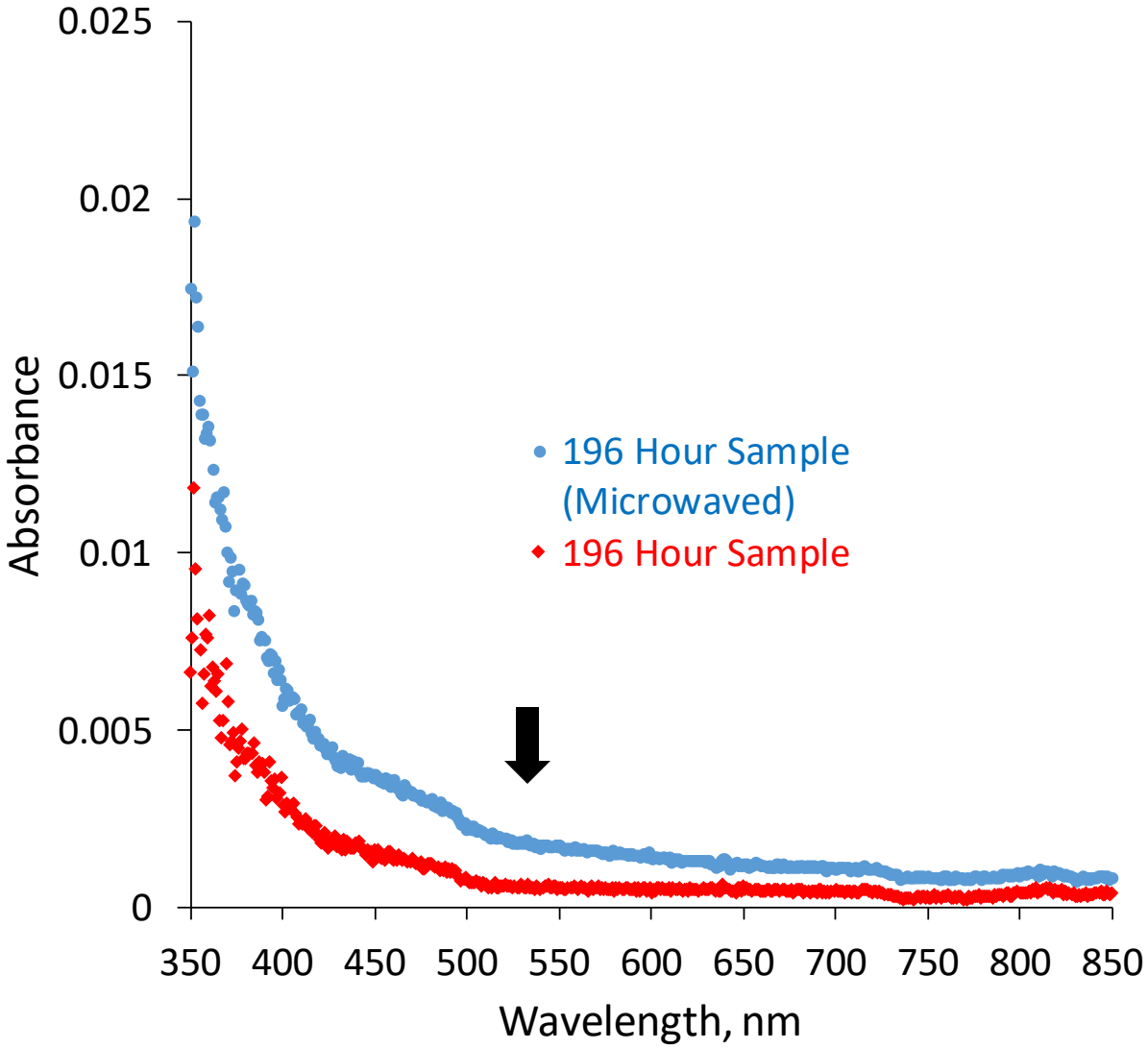

Figure S5. UV-Vis spectra of 5% acetic acid solution after 192 hours (8 days) of exposure to Au-NP glazed coffee mugs with and without regular microwaving of the vessel. The very notable lack of a surface plasmon band (SPB) between 500-600 nm suggests that even with this long exposure to an acidic environment (5% $HC_2H_3O_2$) either with or without microwave heating there is no leaching of nanoparticles from the glaze.

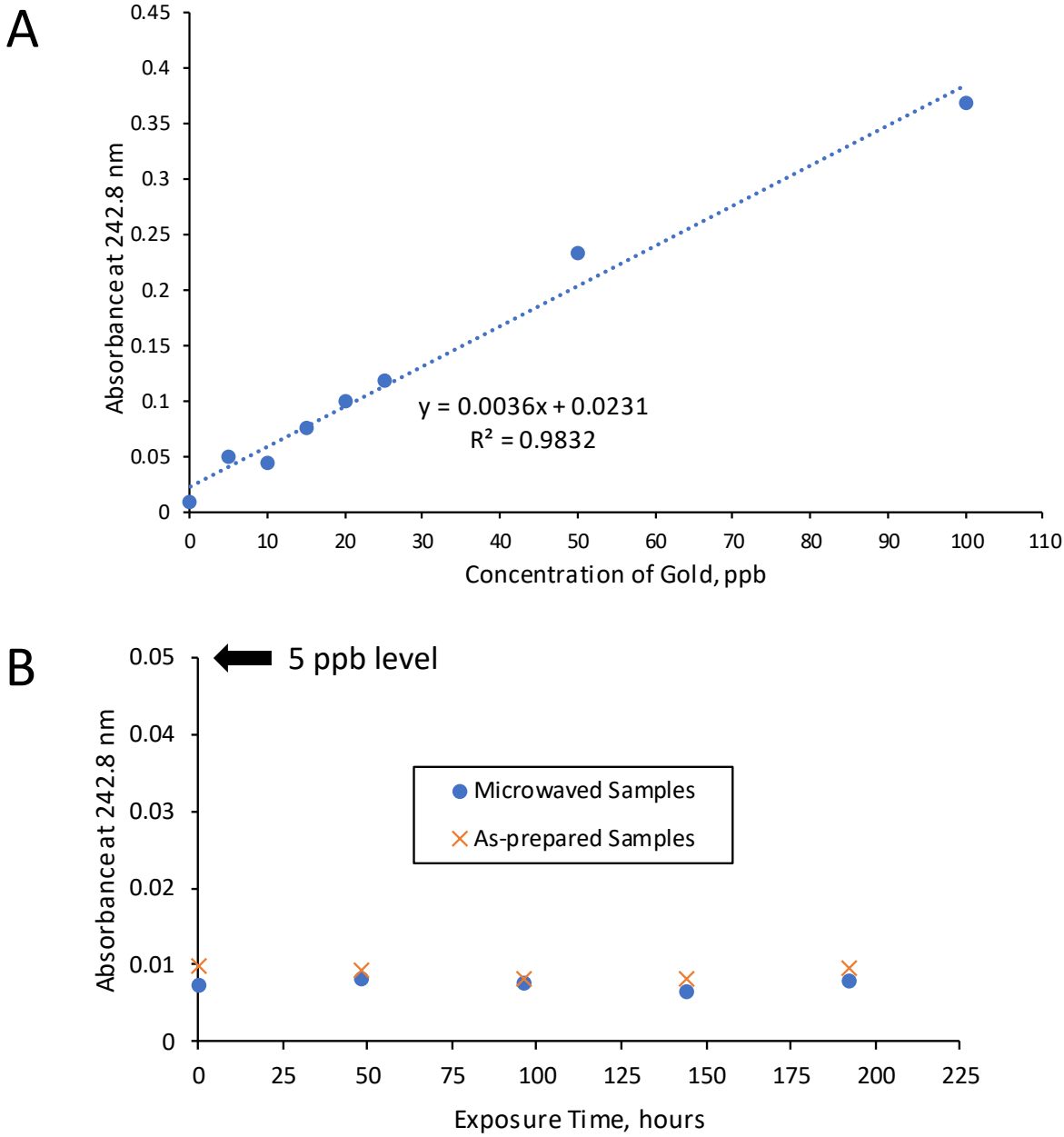

Figure S6. Leaching experiment results including **(A)** gold standard calibration curve generated with graphite-furnace atomic absorption spectroscopy and **(B)** tracking absorbance of aliquots of 5% acetic acid solution sampled from Au-NP glazed mugs as prepared and with routine microwave heating (2 min. on "high") for up to 192 hours (8 days).

Table S1. GF-AA Spectroscopy Absorbance Measurements of Sample Aliquots from Leaching Test ($HC_2H_3O_2$ at 5% and microwave heating over time)

Samples (hrs of exposure)	Absorbance (avg. of 2 readings)
0 (blank)	0.0098
48	0.0093
96	0.0081
144	0.0081
192	0.0095
0^m (blank)	0.0073
48^m	0.0083
96^m	0.0075
144^m	0.0066
192^m	0.0080

Note: ^{m} indicates microwaved samples (2 minutes on “high”)