ESI

Sputtering onto liquids: how does the liquid viscosity affect the formation of nanoparticles and metal films?

Anastasiya Sergievskaya, Rémi Absil, Adrian Chauvin, Kirill Yusenko, Jozef Veselý, Thomas Godfroid, and Stephanos Konstantinidis*

* *Corresponding author's e-mail:* stephanos.konstantinidis@umons.ac.be

Details of SIMTRA simulations

Kinetic energy of sputtered atoms was calculated with the SIMTRA Monte Carlo-based simulation package [1,2] developed in UGENT. Calculations were done for the vacuum chamber having a cylindric shape with diameter of 25 cm and height of 40 cm with respect to target-to-liquid surface distance of 20 cm, target diameter of 5.08 cm, applied voltage of 470 V, collection area of 6.16 cm^2, etc.

References

1 K. Van Aeken, S. Mahieu and D. Depla, The metal flux from a rotating cylindrical magnetron: a Monte Carlo simulation, *J. Phys. D. Appl. Phys.*, 2008, **41**, 205307.

2 D. Depla and W. P. Leroy, Magnetron sputter deposition as visualized by Monte Carlo modeling, *Thin Solid Films*, 2012, **520**, 6337–6354.

Table S1. Parameters used for the fitting with IRENA software of the Au NPs dispersed in the solution with different viscosities.

	60 cP	220 cP	440 cP	630 cP	1000 cP	1400 cP
Scale	0,00244269	0,00034	0,00034	0,000717	0,000206	9,19E-05
Minimum size (A)	0,3	0,3	0,3	0,3	0,3	0,3
Mean radius (A)	11,84	12,79	13,07	12,21	13,79	13,88
Standard deviation	0,9	1,1	0,7	1,4	0,5	4,1
Hard-sphere radius (A)	9,6	15,46	14,14	11,07	16,24	25,42
Volume fraction of hard-sphere	0,30	0,14	0,09	0,27	0,12	0,17

FIGURES S1-S7

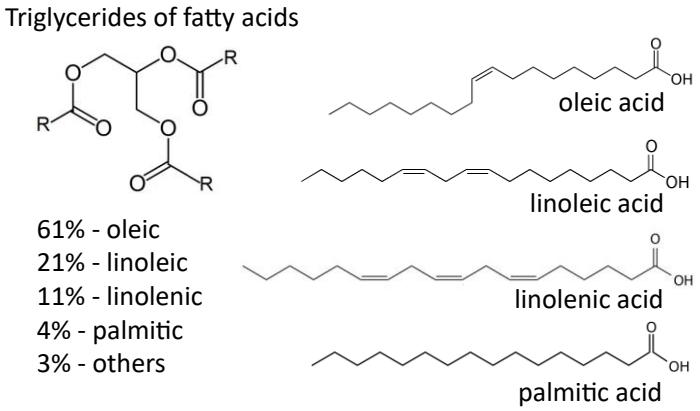

Figure S1. Chemical composition of rapeseed oil.

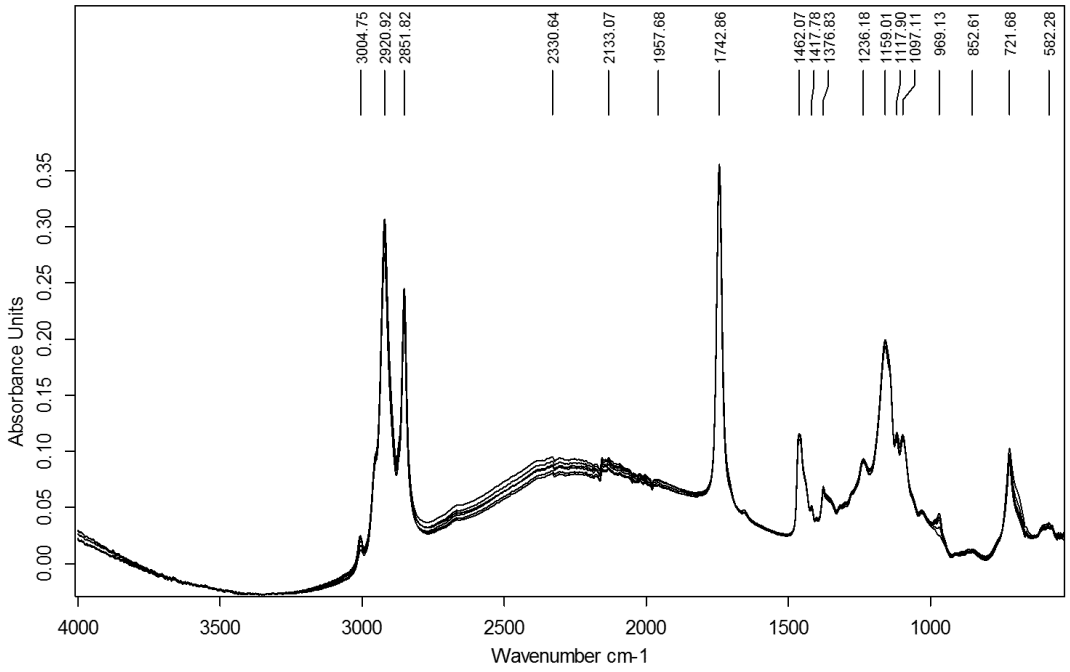

Figure S2. FTIR spectra of polymerized oil used in this research work.

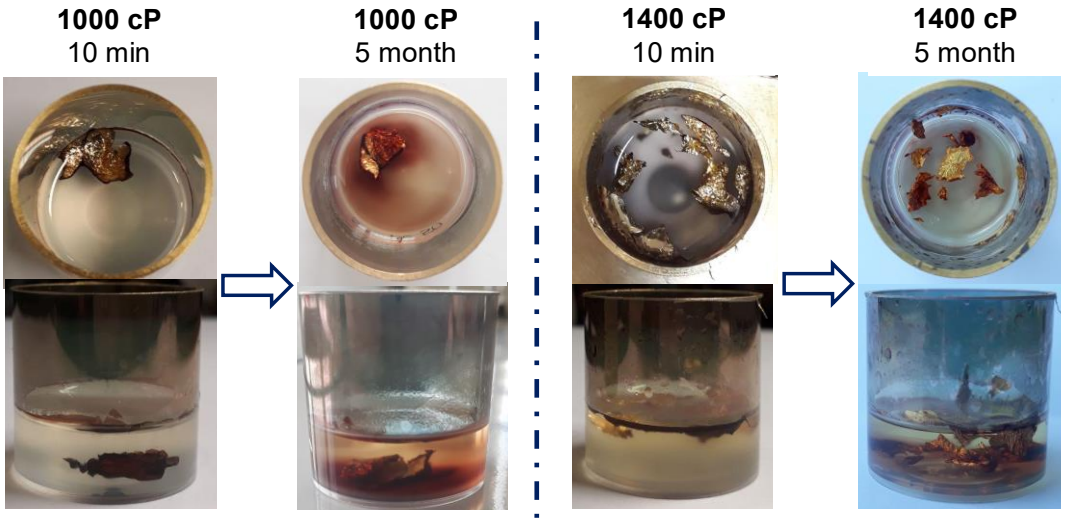

Figure S3. Migration of Au NPs from the bottom surface of the film to the bulk solution within storage time.

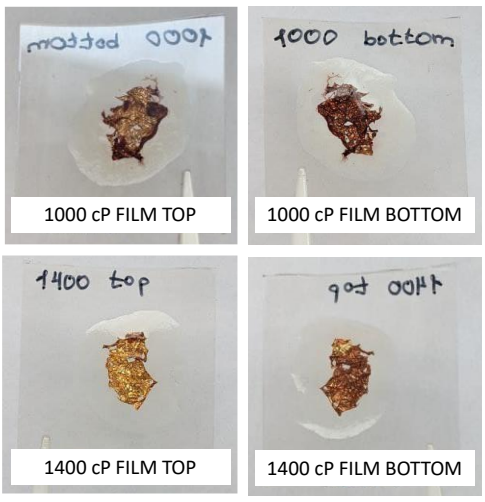

Figure S4. Images of the top and bottom sides of the gold films deposited onto oils with viscosities of 1000 cP and 1400 cP.

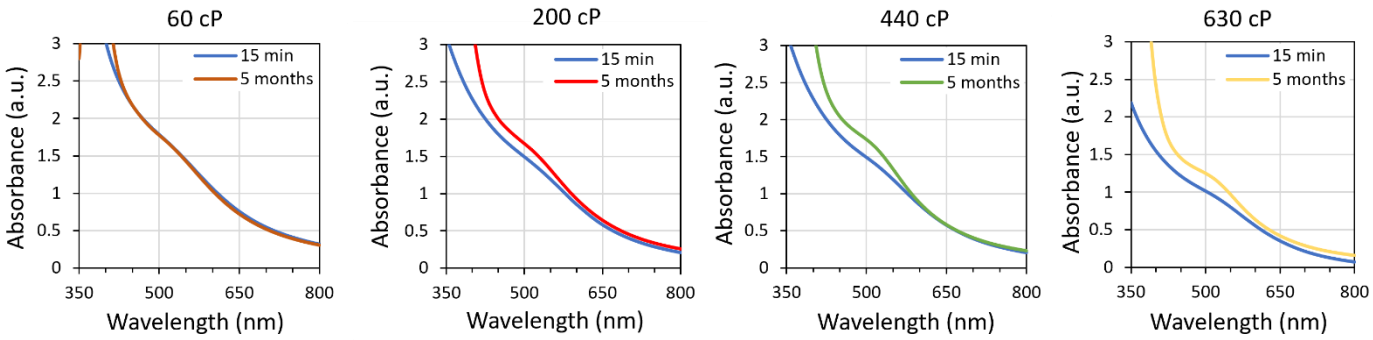

Figure S5. UV-vis spectra of colloidal solutions of AuNPs 15 minutes and 5 month after preparation in case of oil viscosity of 60 cP, 200 cP, 440 cP and 630 cP respectively.

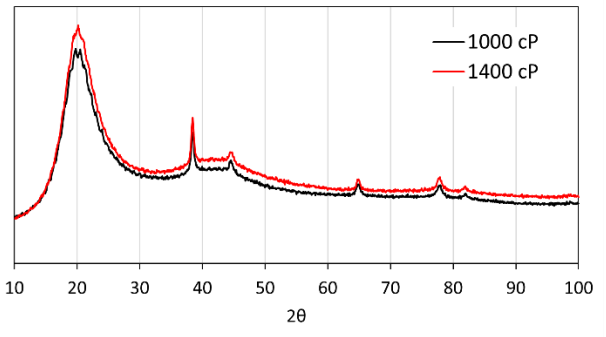

Figure S6. XRD of a gold metallic films placed on a glass plate covered with amorphous TiO_2.

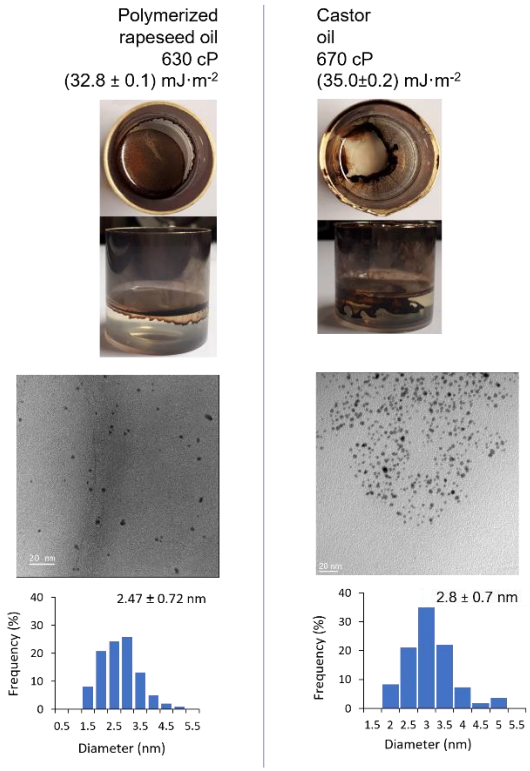

Figure S7. Comparison of the samples obtained by sputtering onto polymerized rapeseed oil (left) and castor oil (right). Sputtering conditions were identical: 4 g of oil, WD of 20 cm, argon pressure of 0.07 Pa, sputter power of 80 W and sputter time of 5 minutes.