

Fabrication and Characterization of Hybrid and Tunable ZnO@Ag Flexible Thin Films Used as SERS Substrates

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Substrate	Deposition time (min)	Final substrate temperature (°C)
	Abbreviation	
Zeonor	15	27
	Zeonor@15	
	30	27
	Zeonor@30	
	60	30
	Zeonor@60	
Topas	15	25
	Topas@15	
	30	25
	Topas@30	
	60	28
	Topas@60	
Topas@2	15	27
	Topas2@15	
	30	27
	Topas2@30	
	60	29
	Topas2@60	

Table S1 – The detailed parameters of MS deposition at RT for ZnO thin films.

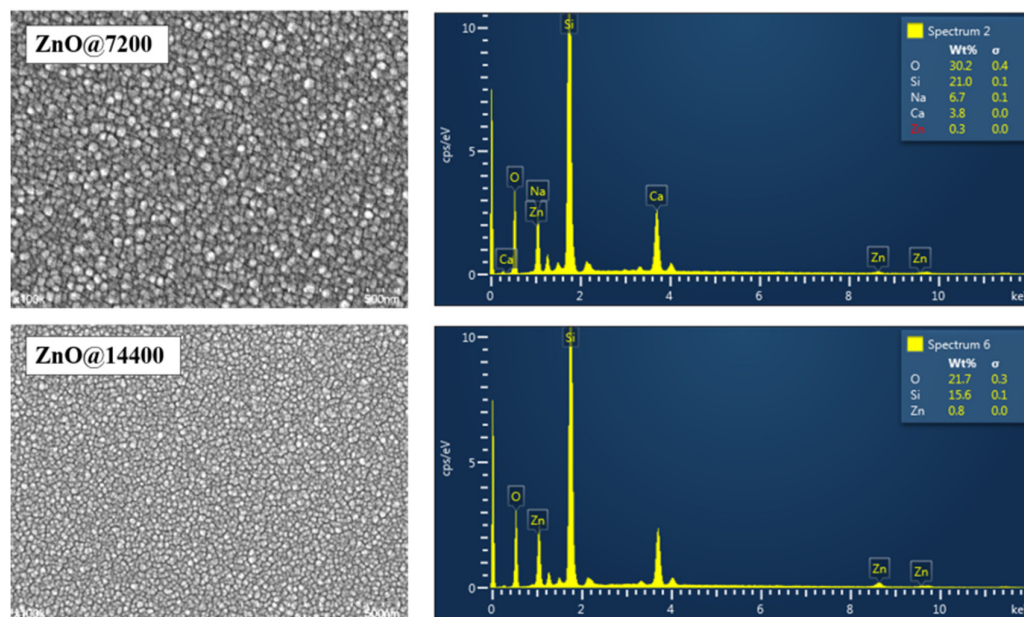


Figure S1. Representative SEM images (left) and EDX spectra (right) of ZnO films deposited on glass by PLD at RT in O₂ bleeding gas and a number of laser pulses of 7200 and 14400, respectively. The growth mode of the films is similar to that of the MS deposited films on Zeonor® and Topas® with a granular structure without defects or voids. This may also be due to the fact that both glass and polymer films have an amorphous structure. EDX spectra show the amount of O and Zn present in the deposited films. Along with the increase of the number of laser pulses, there was a slight increase in the Zn content.

Table S2. – The detailed parameters of MS deposition at RT for Ag thin films on top of ZnO nanostructures.

Substrate	Ag film thickness (nm)	Deposition rate (nm/min)	Current (mA)	Rotation (nm/min)	Abbreviation						
Zeonor	15	7	35	5	Zeonor@Ag						
Zeonor@15					Zeonor15@Ag						
Zeonor@30					Zeonor30@Ag						
Zeonor@60					Zeonor60@Ag						
Topas	30				7	35	5	Topas@Ag			
Topas@15								Topas15@Ag			
Topas@30								Topas30@Ag			
Topas@60								Topas60@Ag			
Topas2	7							7	35	5	Top@Ag
Topas2@15											Top15@Ag
Topas2@30											Top30@Ag
Topas2@60											Top60@Ag

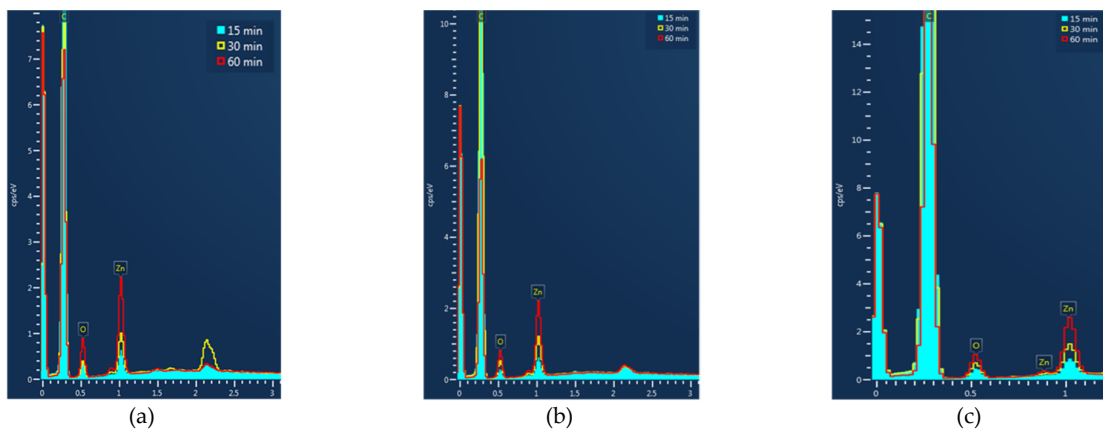


Figure S2. Comparative EDX spectra confirming the film growth and proportional increasing of Zn and O elements in concordance with the increasing deposition time in the ZnO films deposited on (a) Zeonor, (b) Topas® and (c) Topas@2.

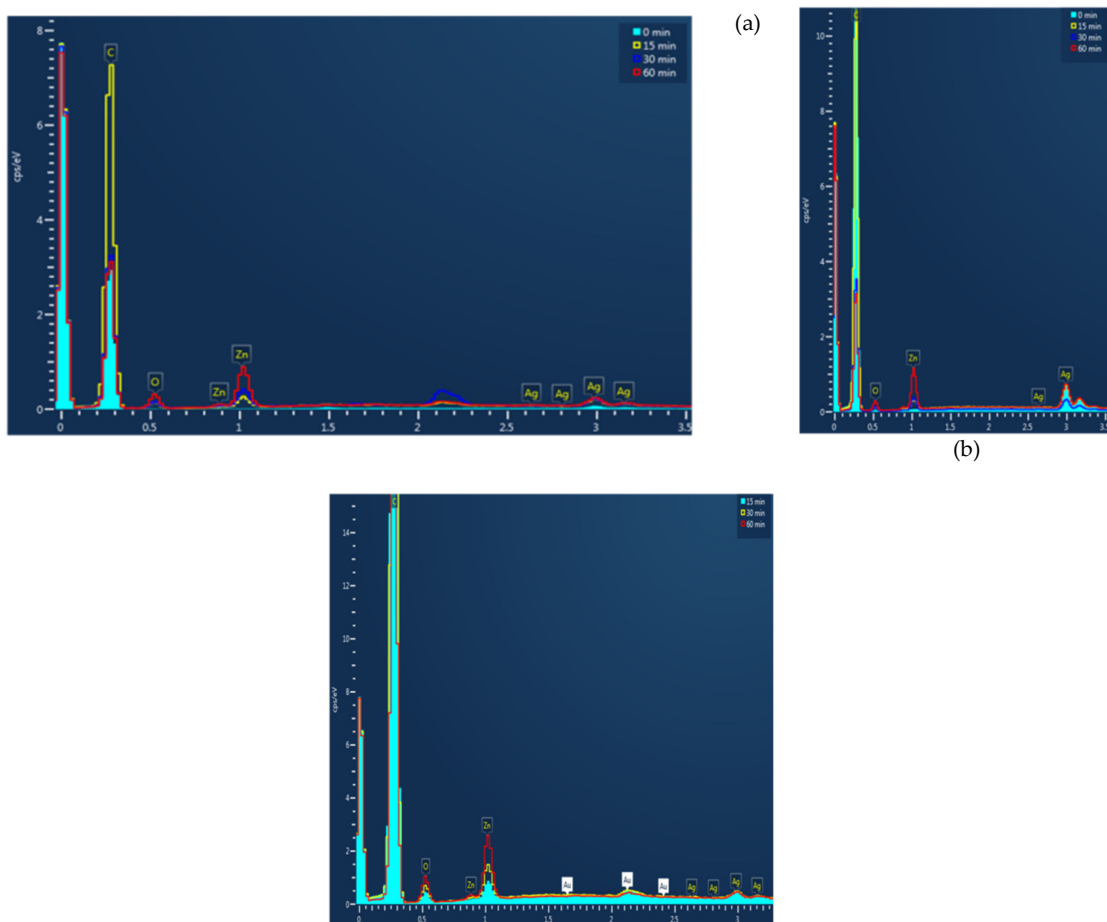
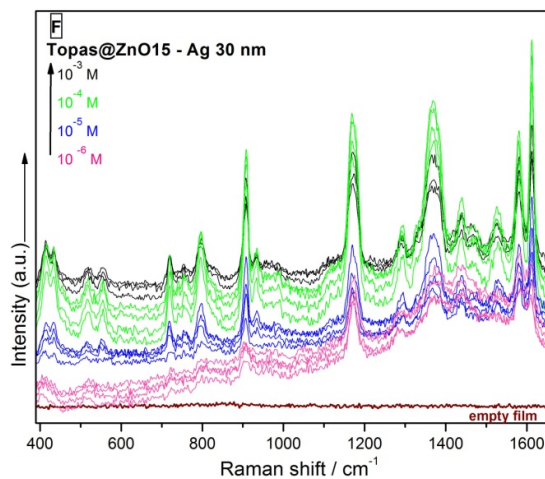
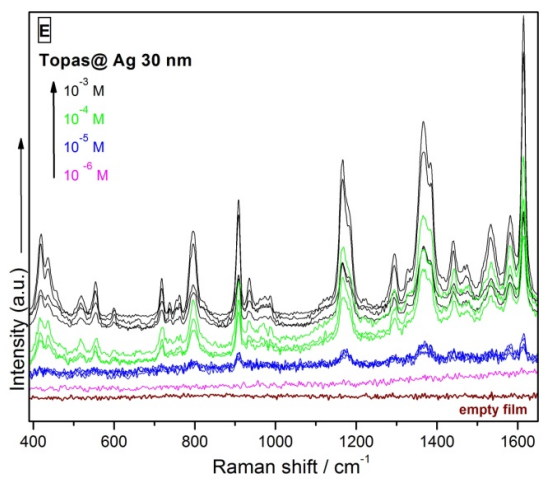
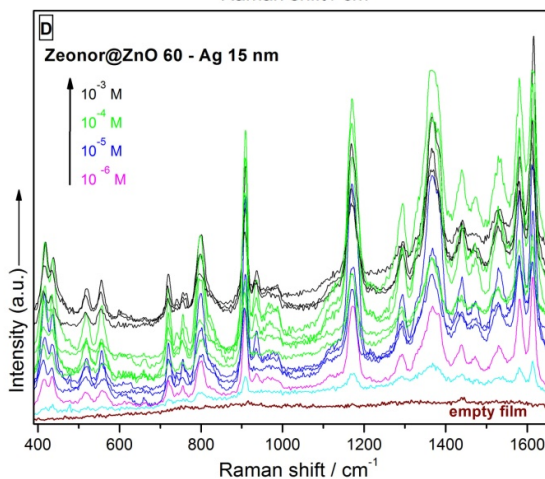
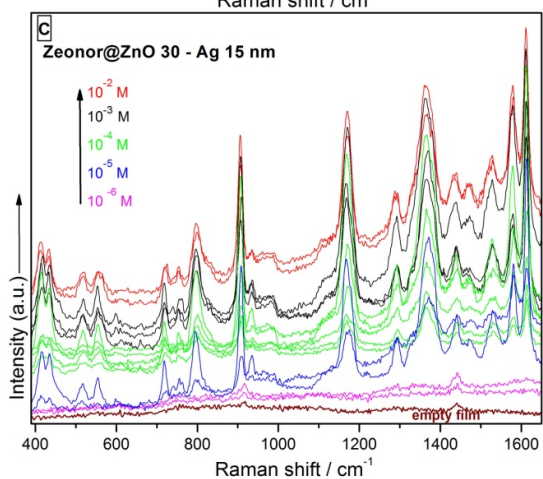
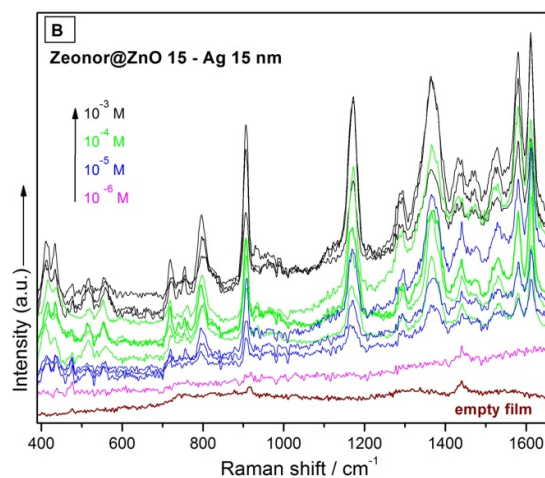
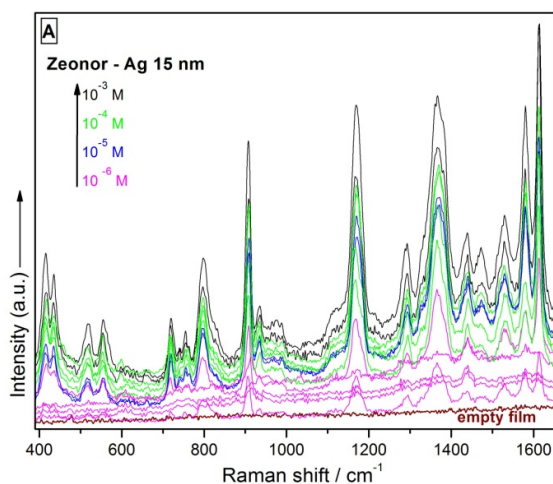


Figure S3. Comparative EDX spectra confirming the Ag film growth and proportional increasing of Ag element in the hybrid samples on (a) Zeonor, (b) Topas® and (c) Topas@2.



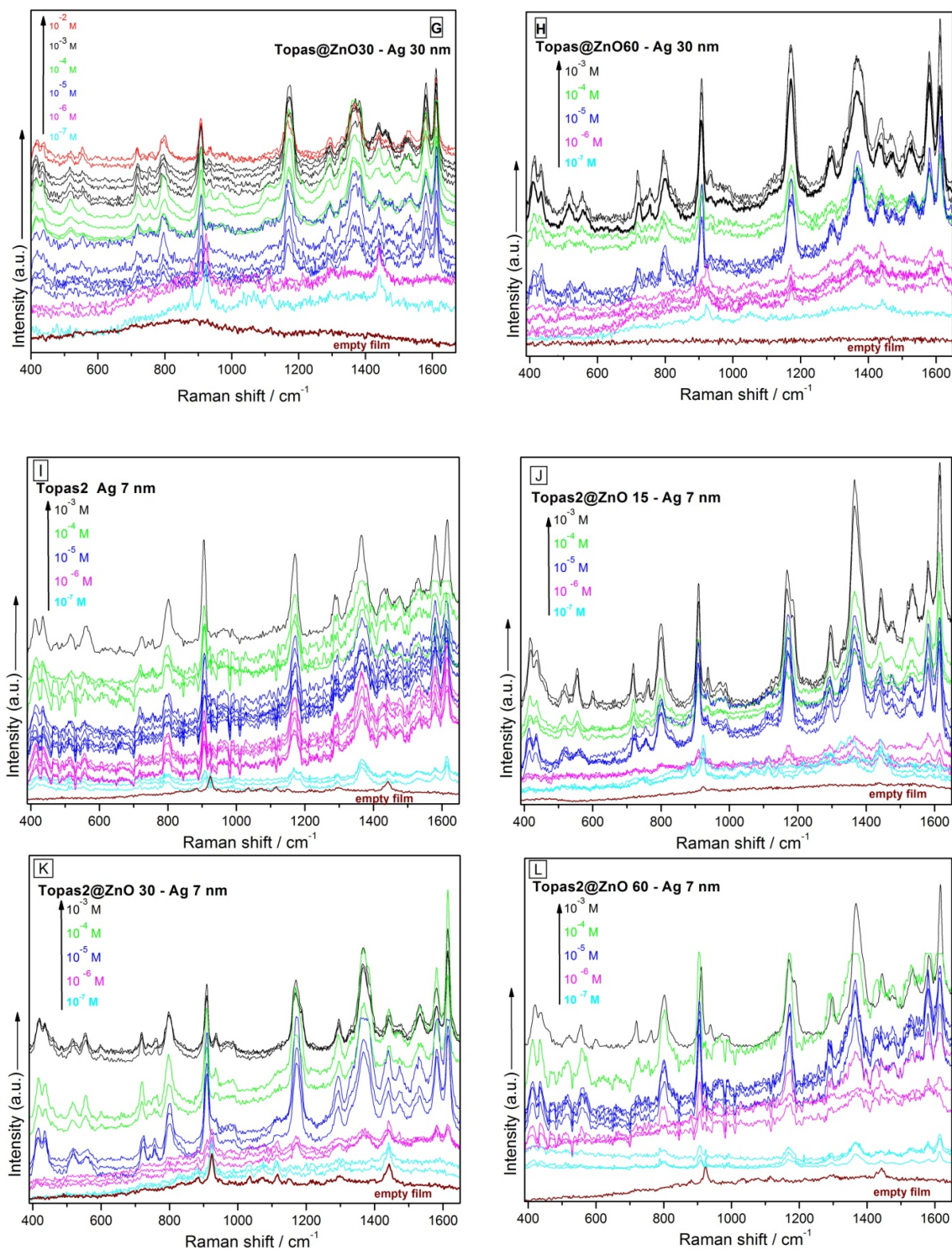


Figure S4. Comparative SERS spectra showing the reproducibility of the fingerprint of CV aqueous solutions on Zeonor® (A-D), Topas® (E-H) and Topas type 2 (I-L). All SERS spectra were measured using a laser power of 5 mW, 10 s/accumulation and 2 accumulations/spectrum.

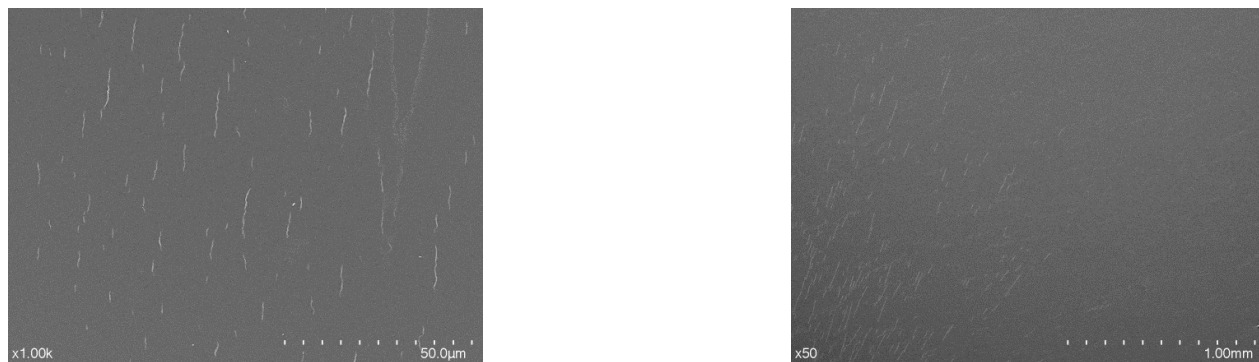


Figure S5. SEM micrographs showing defects in Topas@30 (left) and Topas@60 (right) samples.

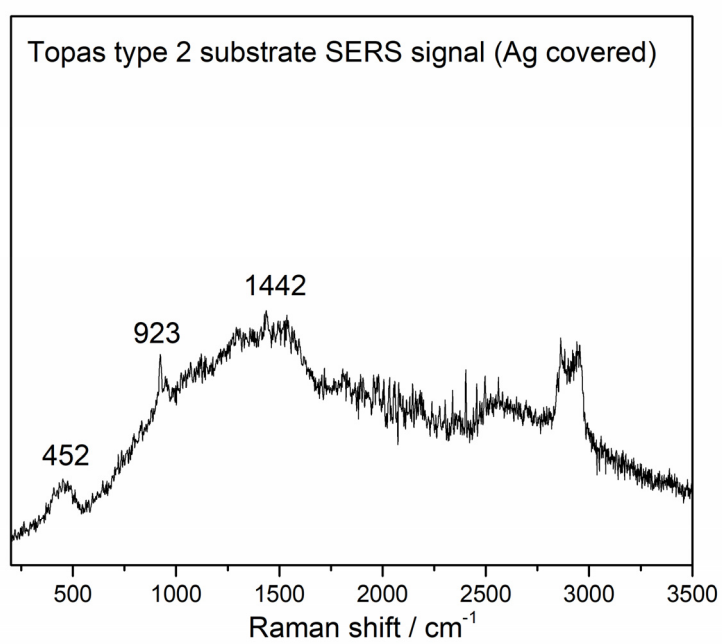


Figure S6. Representative SERS signal from the Topas type 2 substrate obtained after Ag thin film deposition.

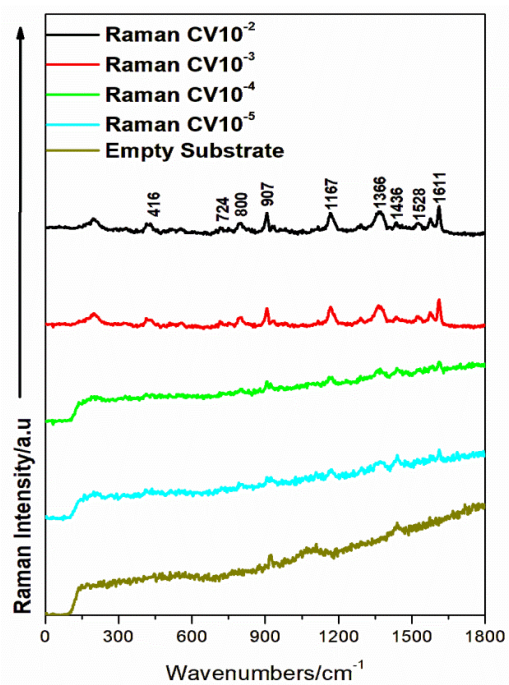


Figure S7. Representative Raman signal of CV aqueous solution of different concentrations on Zeonor® in comparison with the empty plastic substrate Raman signal.