

Cellulose Nanofibril films with Ethyl Lauroyl Arginate

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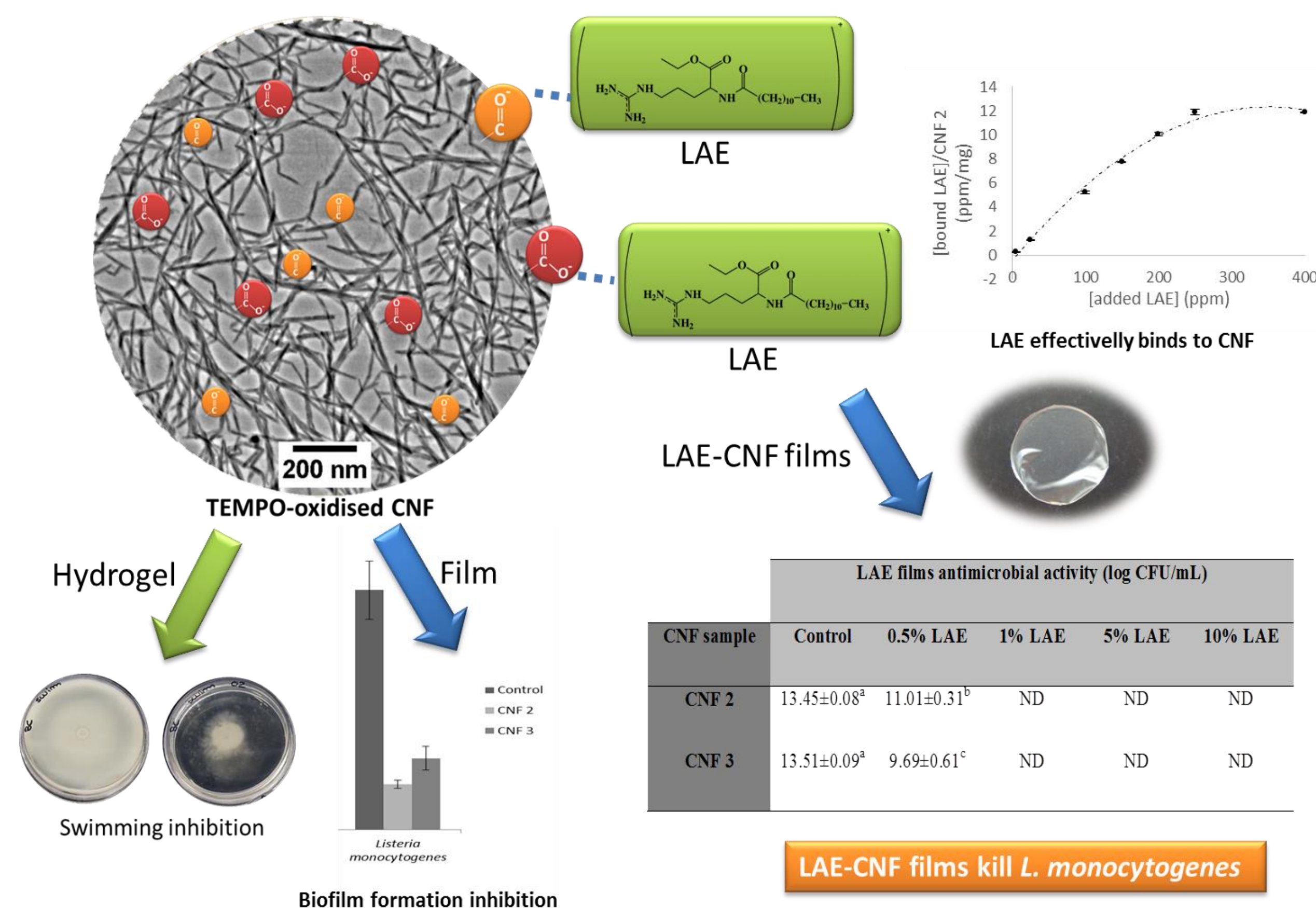
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Graphical abstract

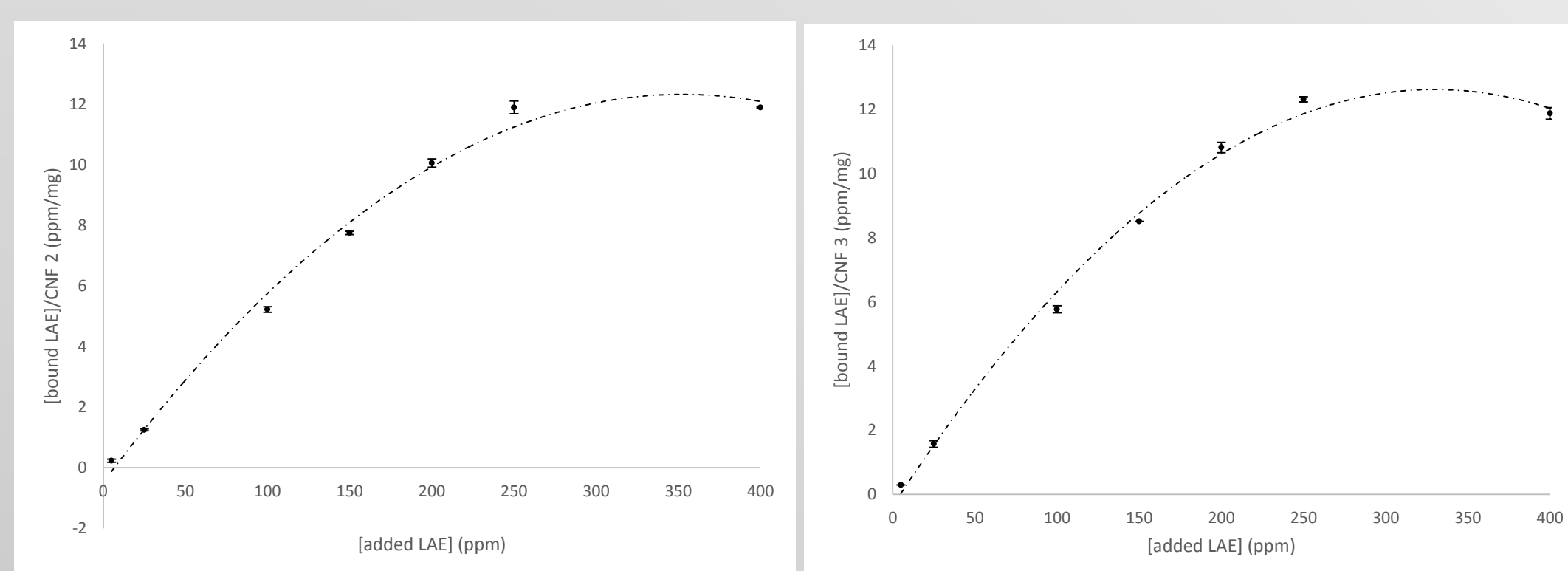


Introduction

Traditional food packaging is made from non-degradable polymers that pose an environmental threat if not disposed of properly. **Cellulose nanofibrils (CNFs)** are particularly suited for **sustainable packaging applications** as they are bio-based, renewable, lightweight and easy to recycle or compost. **Ethyl lauroyl arginate (LAE)** is an antibacterial compound with proved activity against several types of bacteria that is approved by EFSA as a food preservative in heat-treated meat products

Results and Discussion

CNF affinity to LAE



CNF films charge and roughness affect LAE binding
CNF films can bind LAE concentrations up to 15 ppm/mg CNF

CNF sample	2.5% LAE		5% LAE	
	[LAE] _{max} (ppm)	[LAE] _{wash} (ppm)	[LAE] _{max} (ppm)	[LAE] _{wash} (ppm)
CNF 2	16	NQ	32	NQ
CNF 3	16	NQ	32	NQ

No significant LAE release from the CNF films after washing

CNF-LAE films anti-*Listeria* action

CNF sample	LAE films antimicrobial activity (log CFU/mL)				
	Control	0.5% LAE	1% LAE	5% LAE	10% LAE
CNF 2	13.45±0.08	11.01±0.31	ND	ND	ND
CNF 3	13.51±0.09	9.69±0.61	ND	ND	ND

CNF-LAE 0.5% films have a bacteriostatic action against *L. monocytogenes* whereas concentrations of 1% and higher exhibited a bactericidal action

Inhibition halo (mm)					
0.5% LAE	Washed	Non-washed	1% LAE	Washed	Non-washed
CNF 2	22.41	24.81	CNF 2	24.60	26.03
CNF 3	20.00	22.80	CNF 3	25.55	25.56
2.5% LAE	Washed	Non-washed	5% LAE	Washed	Non-washed
CNF 2	25.92	27.66	CNF 2	26.28	29.60
CNF 3	26.53	28.27	CNF 3	26.12	29.54

Both washed and non-washed films are effective against *L. monocytogenes* with the higher inhibition halos at higher LAE concentration

Effective LAE binding to CNF films

CNF-LAE films have anti-listerial activity

Acknowledgements

This work was funded by MINECO (AGL2015-67362-P). Authors acknowledge the use of Servicio General de Apoyo a la Investigación-SAI, Universidad de Zaragoza