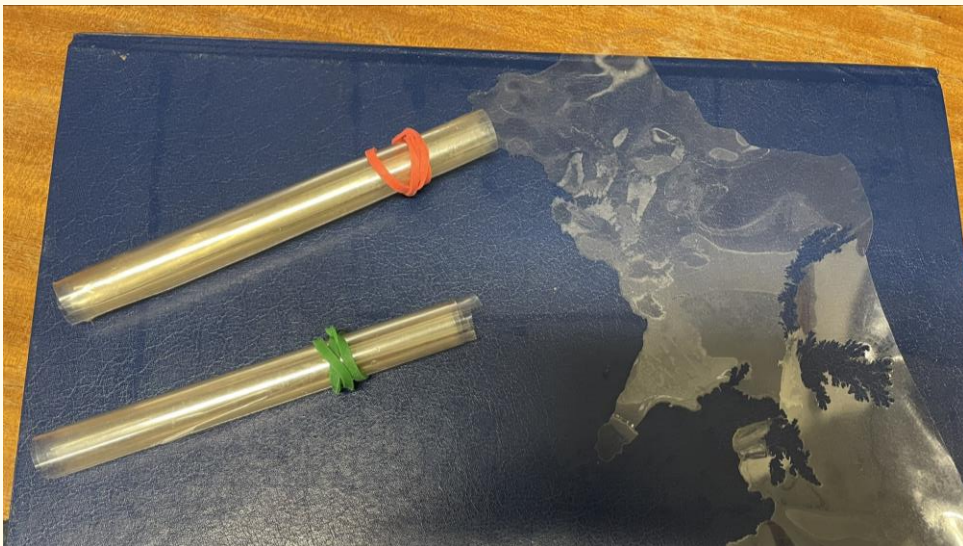
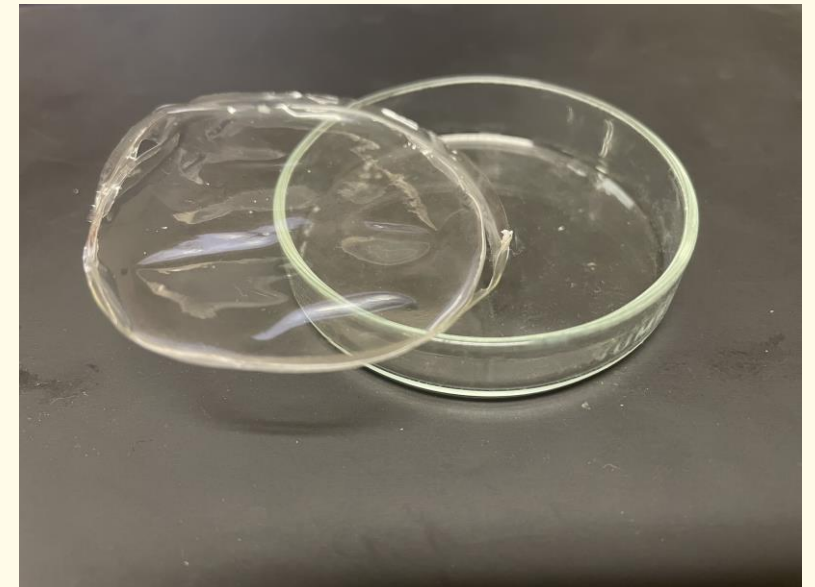


# PhD - Developing a biodegradable, antimicrobial plastic film derived from sodium alginate



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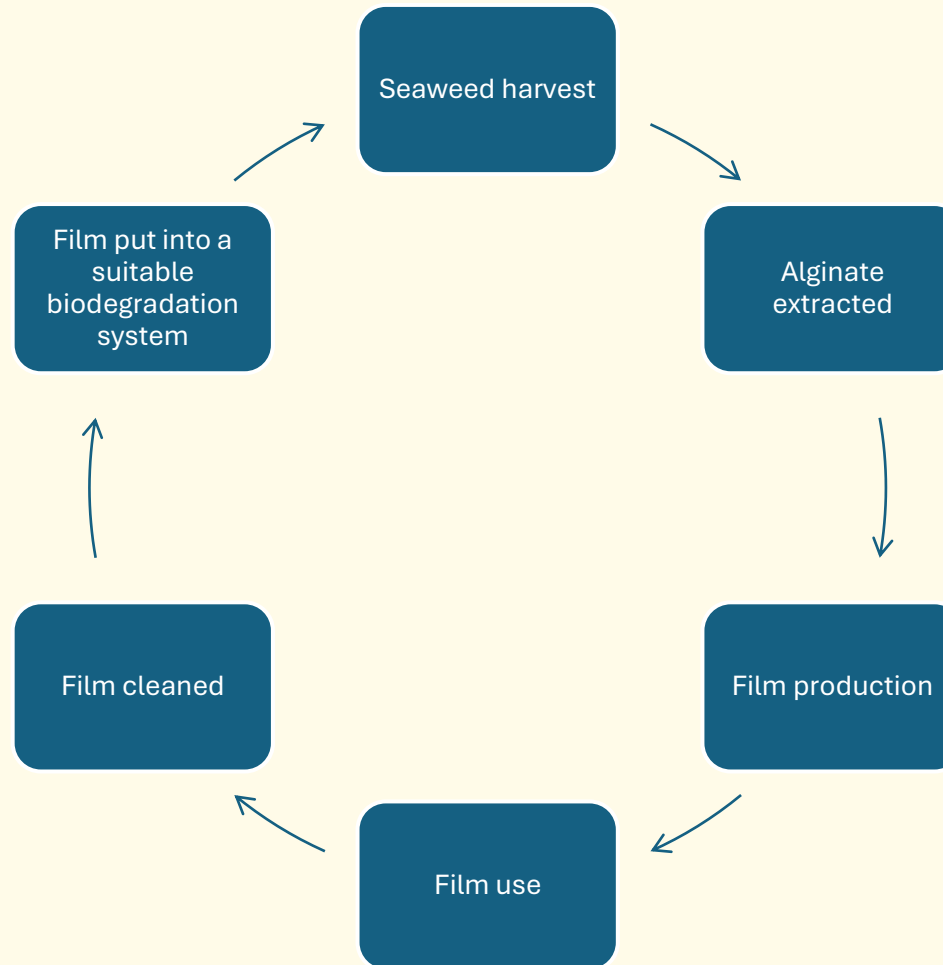


# Material targets

- Films in the food industry
- Crude oil and natural gas as a resource
- Alternative bio-based films
- Seaweed extracts
- Sodium alginate
- Biodegradable



# Circularity of an alginate-based film ideology

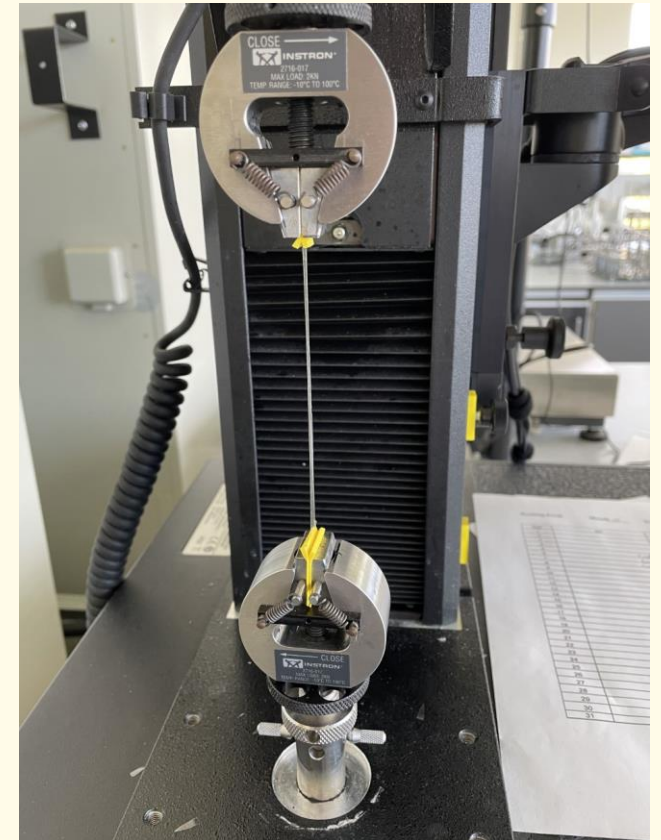


# Plasticisers

SA2	m2	eo0.4	g4	temp2.5	f1m0.25	m0.5vo0.1	m0.5g1	cinnamonsup	SonicSA2.5	2-Hydroxy 50-20m	2-Hydroxy 70-5m
SA2.5	m4	ro0.1	x1	temp5	f2m0.5	x1vo0.025	m0.5x4	garlicsup	Met-photo Daylight	2-Hydroxy 50-30m	2-Hydroxy 70-10m
SA3	so0.1	ro0.2	x2	temp10	f0.5vo0.025	x2vo0.05	g1cnc5	turmericup	Met-photo 5m	2-Hydroxy 50-1h	2-Hydroxy 70-20m
f1	so0.2	ro0.4	x4	cnc2.5	f1vo0.05	x4vo0.1	x4cnc5	gingersup	Met-photo 10m	2-Hydroxy 60-Day	2-Hydroxy 70-30m
f2	so0.4	thy1	smc2.5	cnc5	f2vo0.1	cacl2	f2g1cnc5	Aloe	Met-photo 20m	2-Hydroxy 60-5m	2-Hydroxy 70-1h
f4	vo0.1	man1	smc5	cnc10	m0.125x1	m0.5	f2x4cnc5	Lavender	Met-photo 30m	2-Hydroxy 60-10m	
s1	vo0.2	man2	smc10	f0.5x1	m0.25x2	f2g1	m0.5g1cnc5	Lemon	Met-photo 1hr	2-Hydroxy 60-20m	
s2	vo0.4	man4	hph2.5	f1x2	m0.5x4	f2x4	m0.5x4cnc5	Tea Tree	2-Hydroxy 50-Day	2-Hydroxy 60-30m	
s3	eo0.1	g1	hph5	f2x4	m0.125vo0.025	f2cnc5	cacl1	Eucalyptus	2-Hydroxy 50-5m	2-Hydroxy 60-1h	
m1	eo0.2	g2	hph10	f0.5m0.125	m0.25vo0.05	m0.5g1	g2cacl1	Large lab scale	2-Hydroxy 50-10m	2-Hydroxy 70-Day	

# Methodology overview

- Lab-scale film production
- Plasticiser trials
- Mechanical testing
- Microscopy
- Photography & transparency
- Film thickness
- Water Vapour Permeability
- Seaweed antimicrobial
- Alternative antimicrobials
- Scaling-up
- Future studies





# Laboratory Film scale up

Small film size: 60mm x 50mm

350mm x 250mm

300mm x 200mm

250mm x 150mm



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