Black & Green

50% less with

More Flavour from less

Steve Minter

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- Provides solutions to Industry led problems
- Primary focus:
    - Food Industry
        - Pharmaceutical Industry
        - Agrochemical Industry

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- Food - Projects requested from:
  - Global companies
  - Major snacks producer
  - Joint Venture with Honda Trading Europe

- Drug Delivery - Projects:
  - Nasal delivery
  - Topical delivery
  - Oral delivery
  - With Global players

The UK Government identified a health issue

- Consumers are ingesting too much Sodium in their diet
  - Potential solutions were investigated
    - Substituting Sodium for Potassium/Magnesium
      - Metallic Flavour/Bitter
      - Health issues
    - Using Yeast extract or DNA / Peptide blends
  - None have been found to be acceptable

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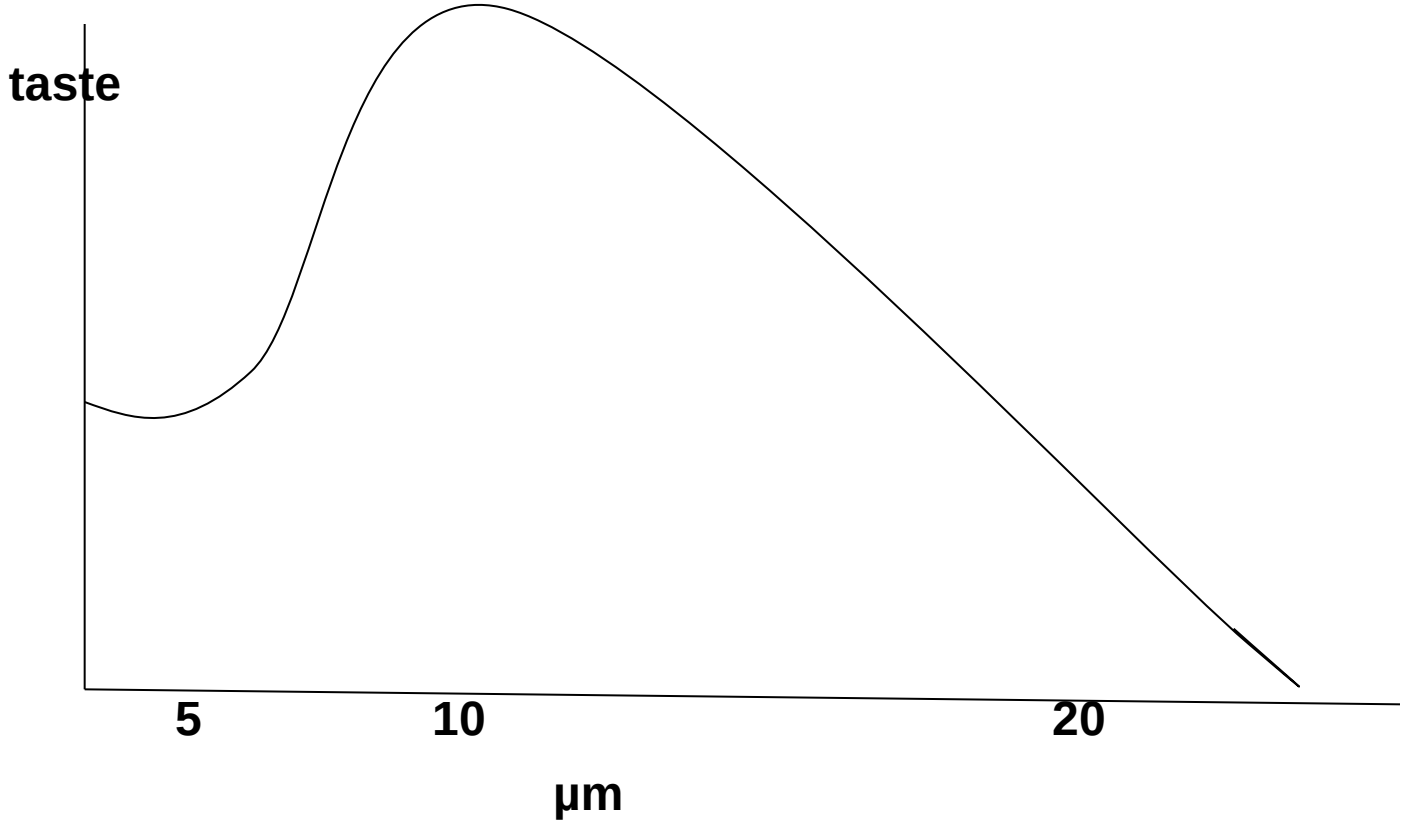
The issue

- Food Standards Agency
  - set targets to reduce salt (sodium) in processed food
  - industry responded – reduced sodium and found functionality issues and/or flavour issues
  - now finding it difficult to reduce levels set for 2010/2012

Particule size vs flavour



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eminate's response

- the development of a new crystalline form of common salt
- developed several forms of our salt in response to specific needs/application
- approached the FSA for clarification on Novel status

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Food – Soda-Lo

- New formulation of salt – *“Soda-Lo”*
- Also able to encapsulate, delivering:
  - flavours
  - Bioactive
  - Colours

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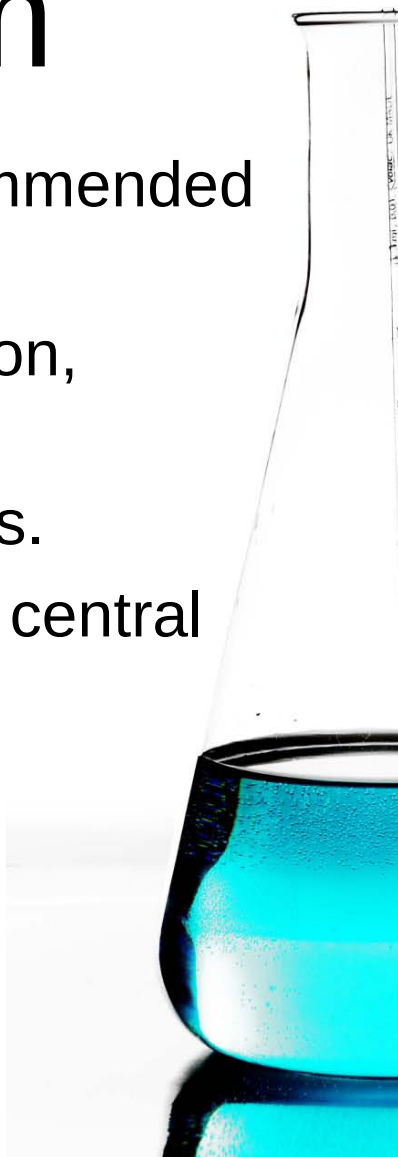
SALT-The Problem

- Consumption in the diet is higher than recommended (8.6g cf 3.0g recommended)
- Has a major impact on the health of the nation, increased cardiovascular disease.
- Derived predominantly from processed foods.
- Industry under pressure to reduce salt, from central government.
- Available solutions pose their own problems
  - taste, clean label, functionality

- **– BUT is this low enough?**



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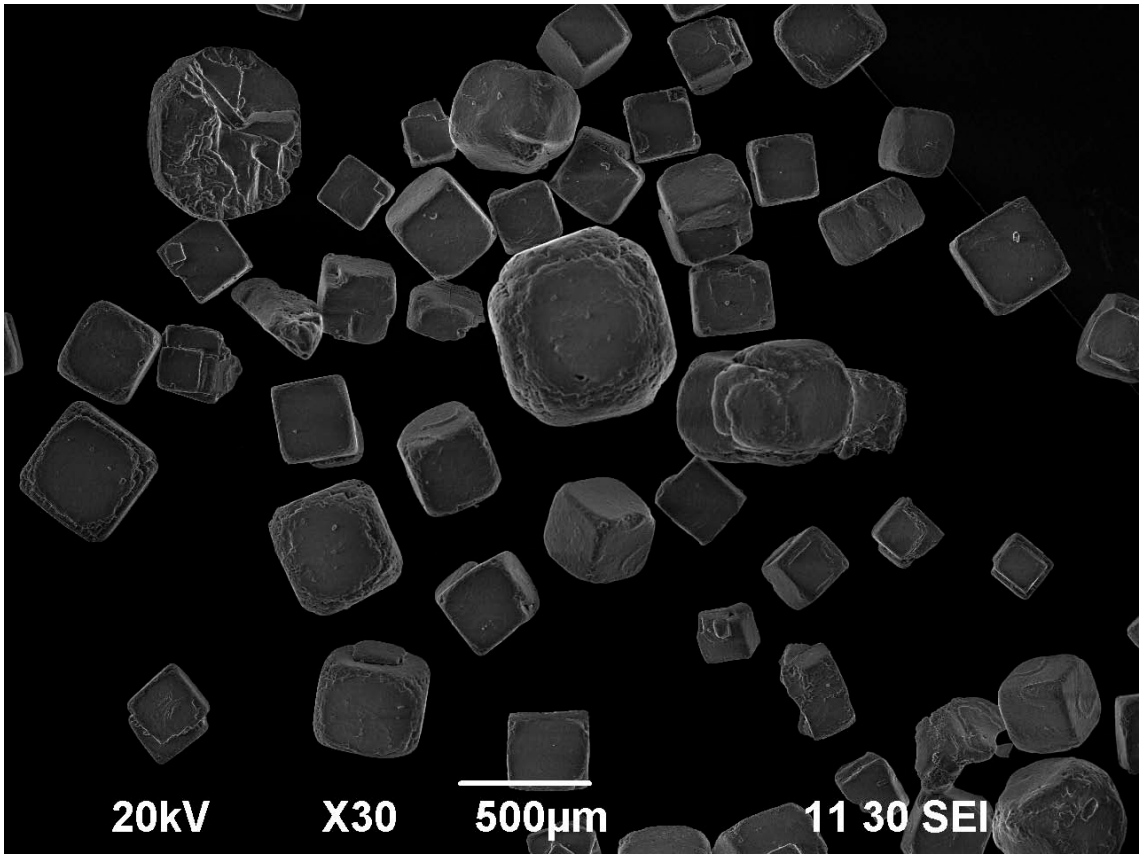
We are introducing a new technology
– not seen in the food industry before

How is this done?

Table Salt



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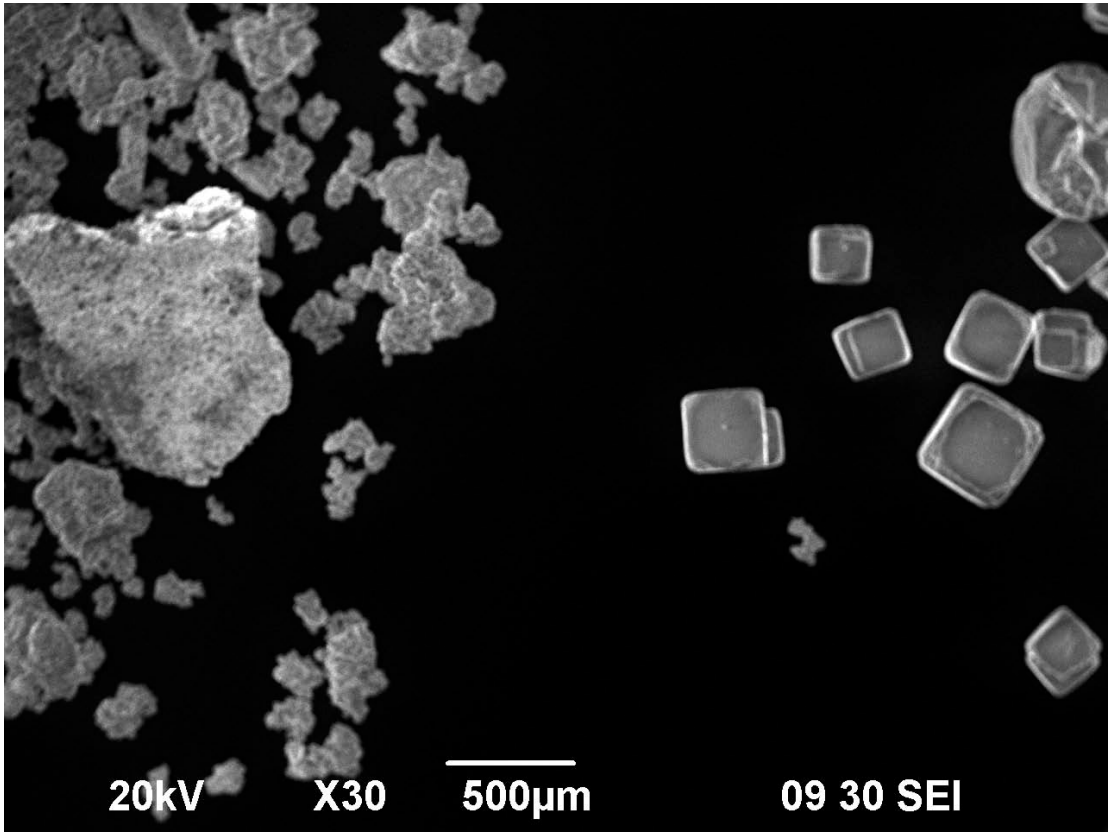
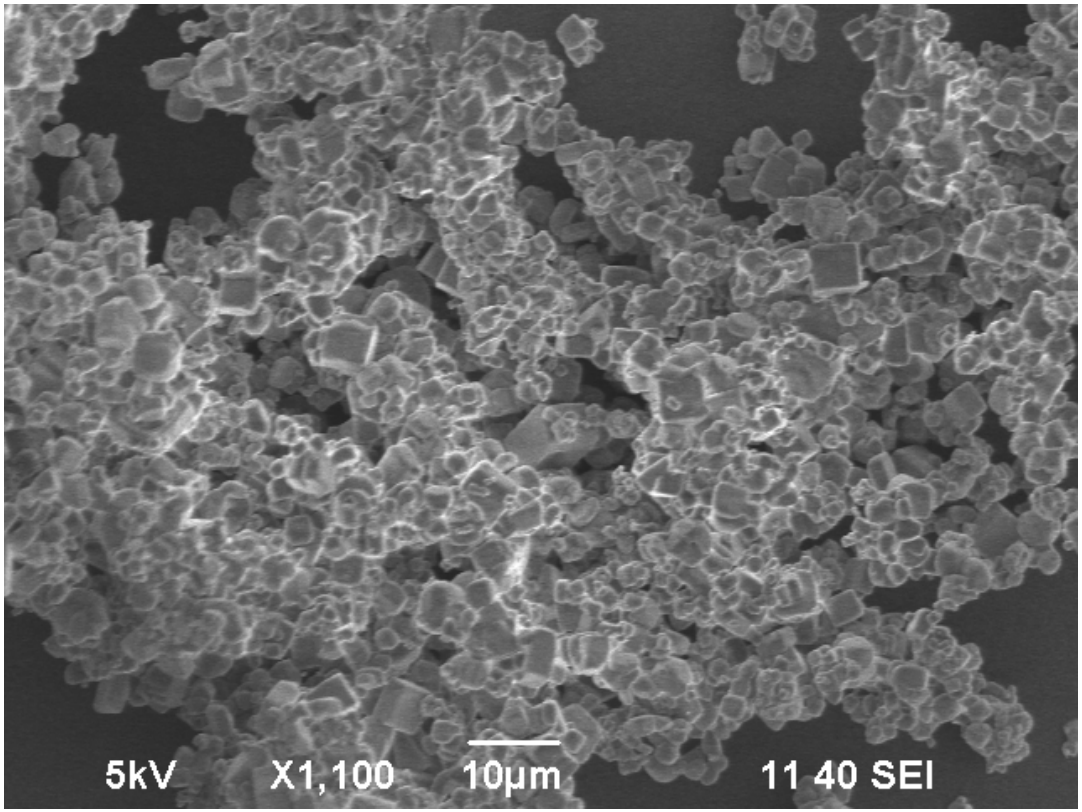
Milled salt



Agglomeration



eminate's solution

- Develop a new form of salt combining a number of technologies
- "Soda-Lo" properties include:
  1. fine powder for >18 months
  2. no clumping
  3. remains free flowing
  4. greater flavour impact than table salt
  5. no issues of contaminating tastes
  6. based on existing food ingredients

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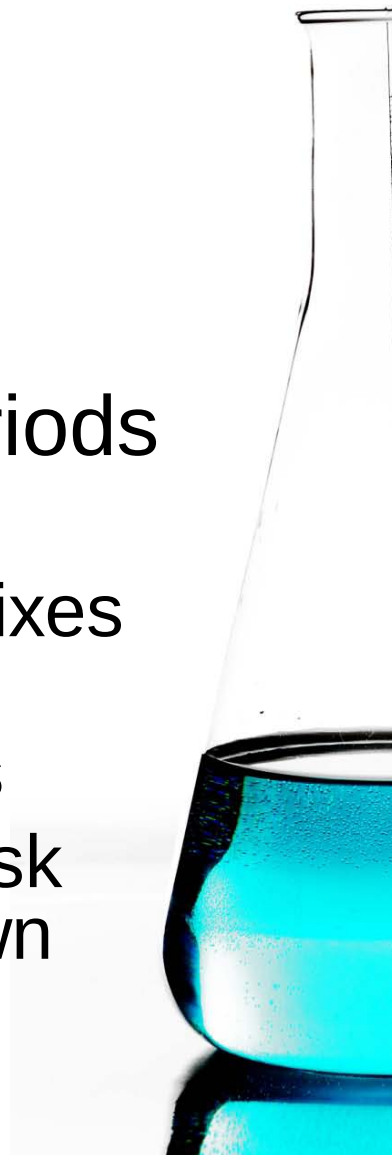
Which means that, “Soda-Lo” offers

convenient storage over extended periods

1. does not deteriorate on storage
2. easily added to existing ingredient mixes
3. use at lower levels than existing salt, allowing company to meet guidelines
4. additional flavours not needed to mask replacers, keeping ingredient list down
5. no additional listed ingredients



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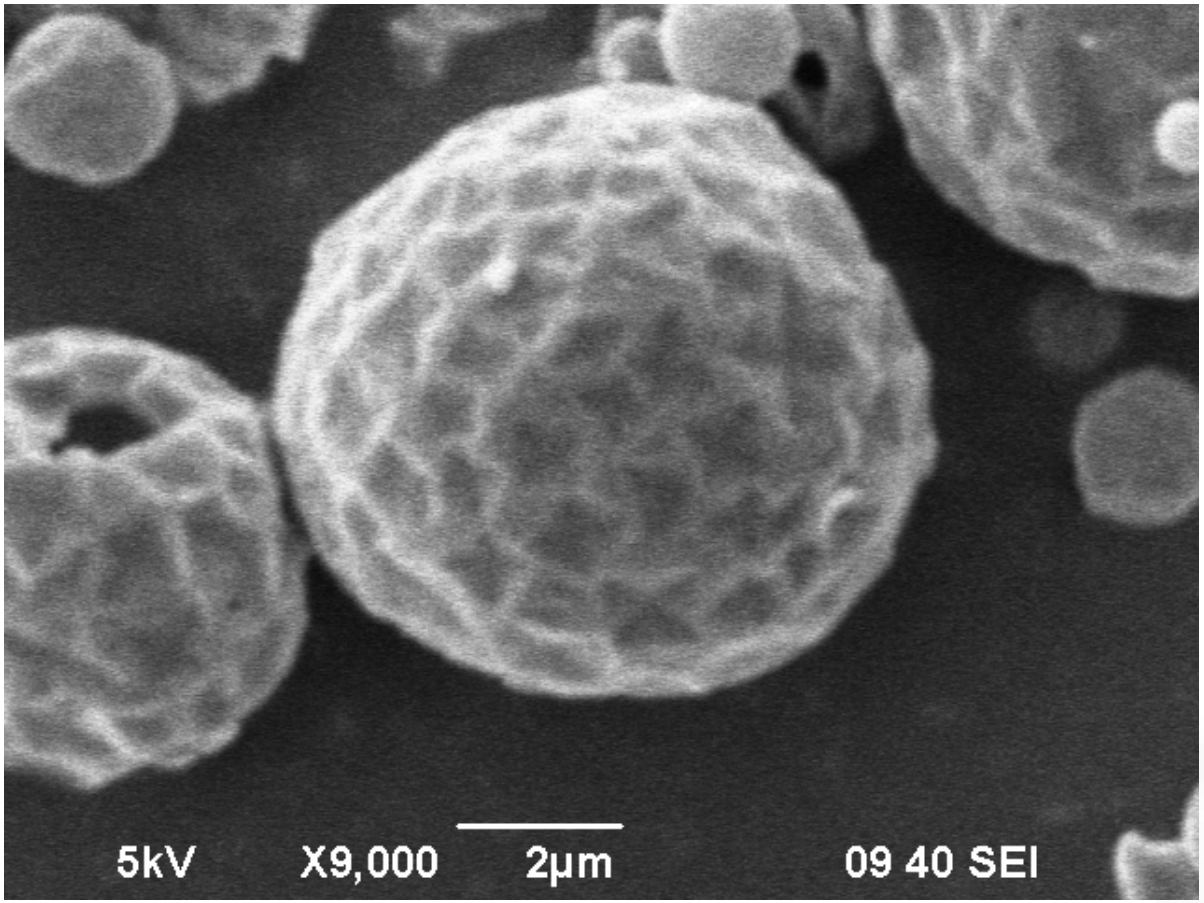
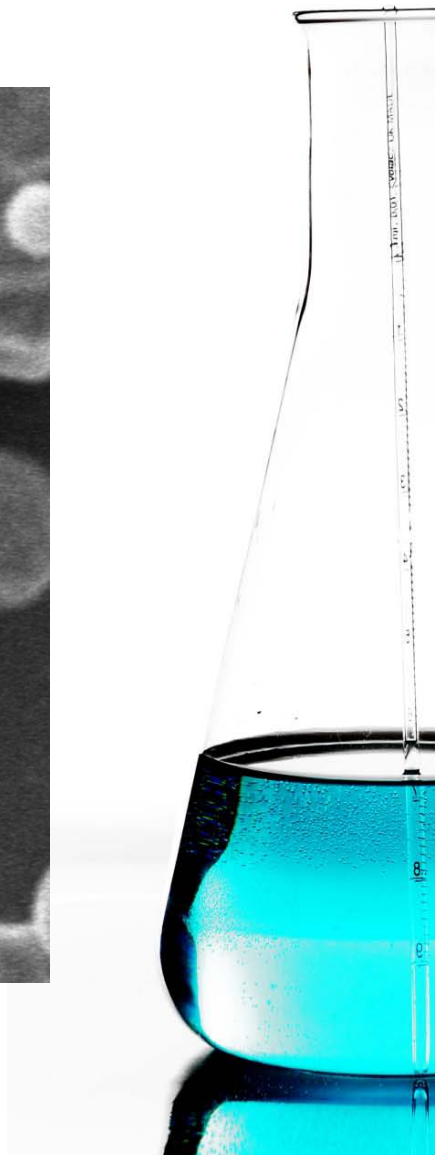
“Soda-Lo”





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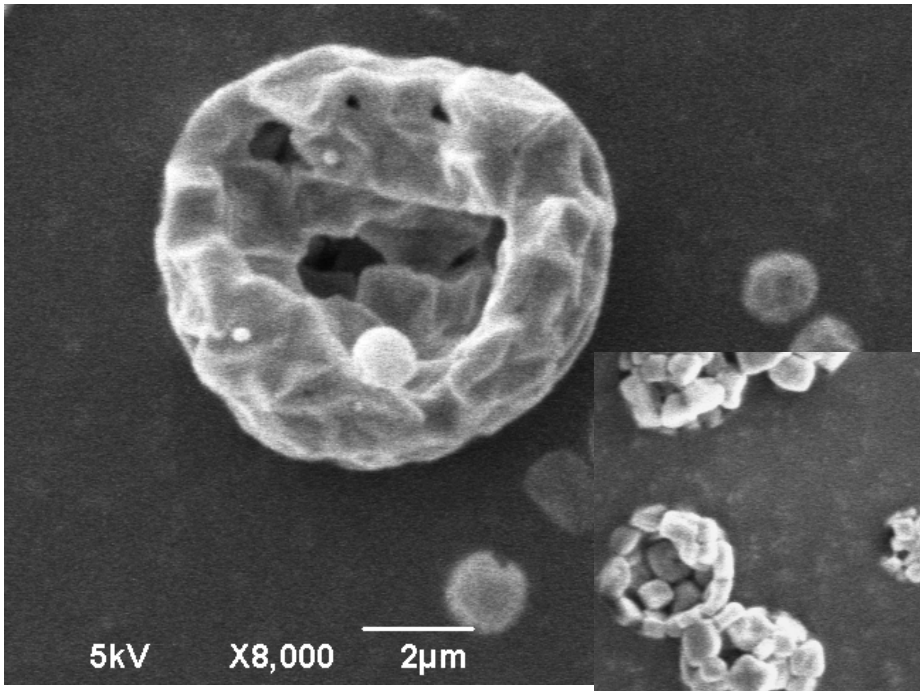
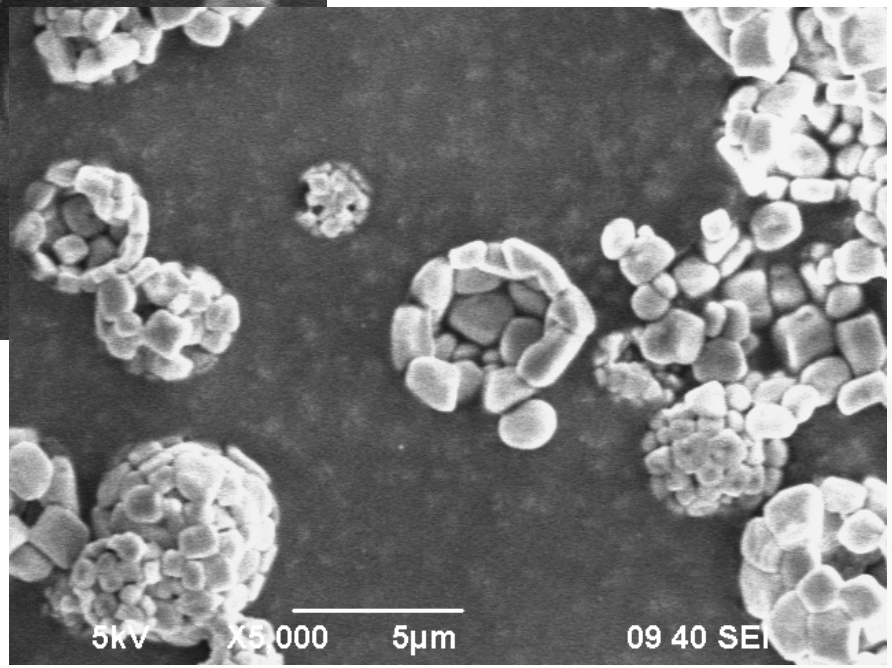
“Soda-Lo”, Internal structure





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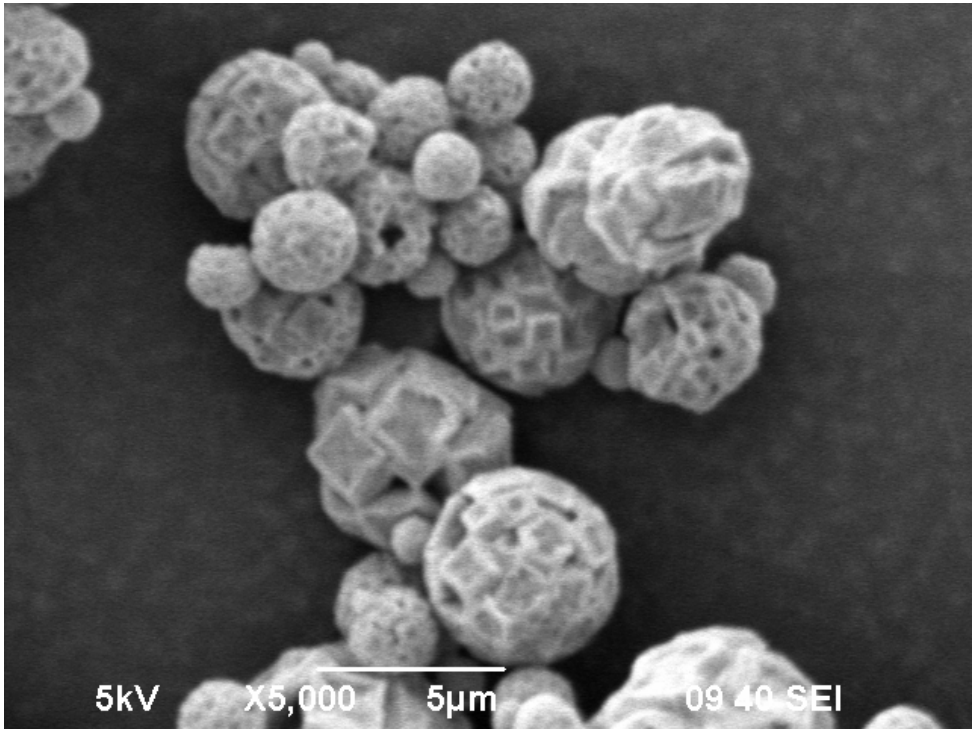
Clean label version for sauces



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Applications

“Soda-Lo” has been used in:

- Snacks
- Bread
- Sausages
- Sauces

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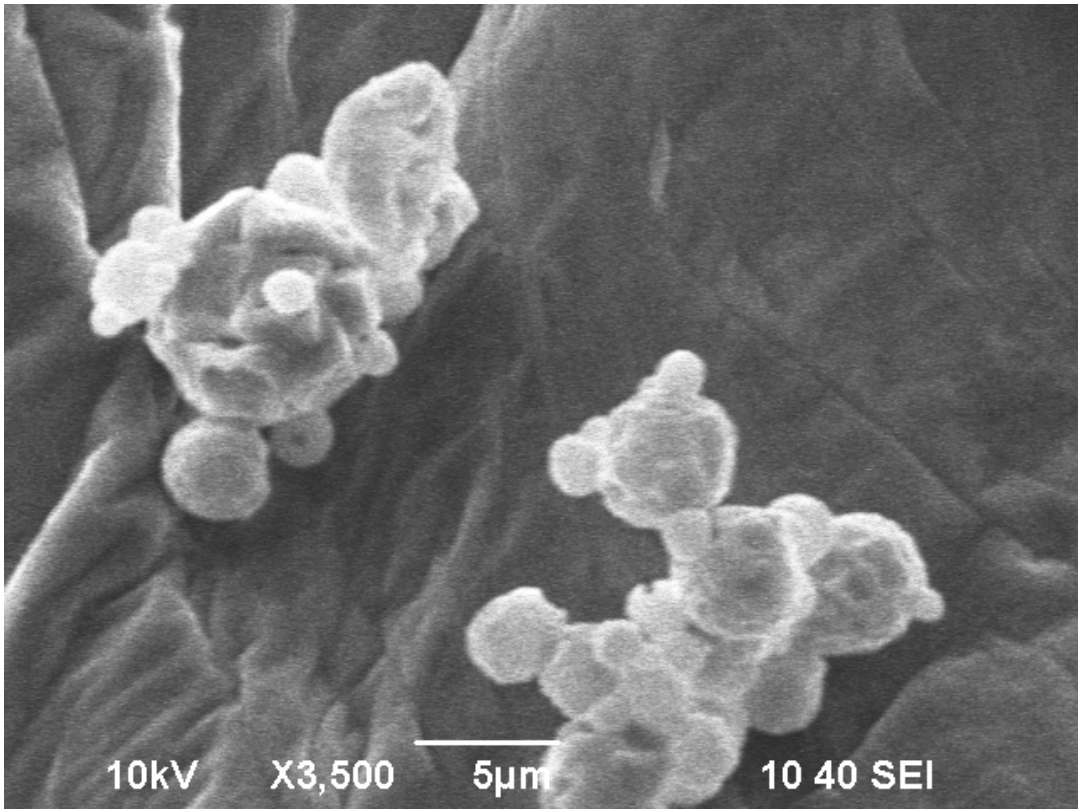
“Soda-Lo” on crisps



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“Soda-Lo” in bread

1. Salt reduced in standard supermarket bloomer from 1.8% -> 1% - **good product**
2. Salt reduced in major industrial bakery model from 1.8% -> 0.7% - **good product**
3. Salt reduced in university model loaf 0.8% -> 0.3% - **good product**

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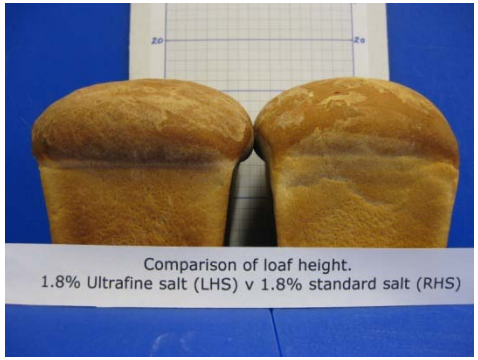
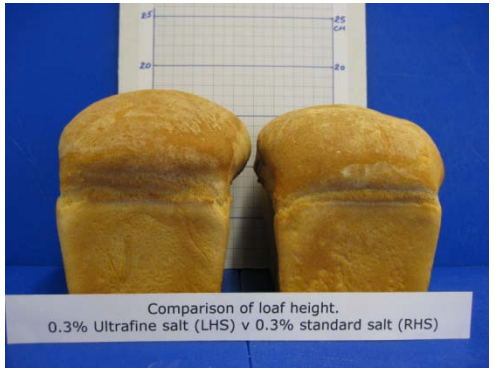
“Soda-Lo” in bread



Comparison of loaf height.
1.8% Ultrafine salt (LHS) v 1.8% standard salt (RHS)

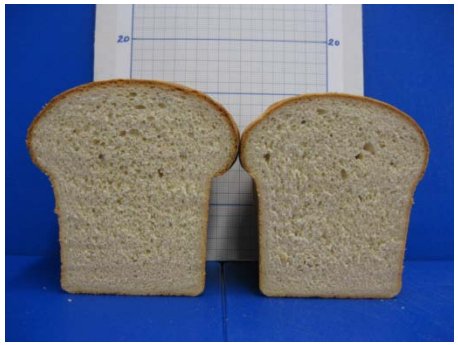


Comparison of loaf height.
0.3% Ultrafine salt (LHS) v 0.3% standard salt (RHS)

Water Activity

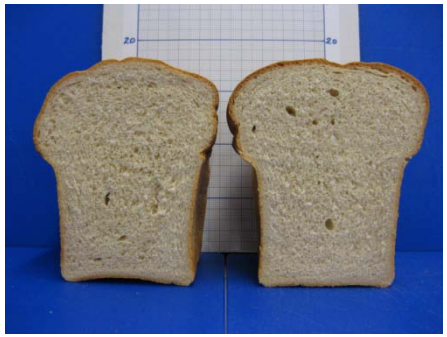
% salt	a_w value	
	Soda-lo 20	Normal salt
1.8	0.964	0.963
1.6	0.967	0.966
1.4	0.969	0.969
1.2	0.971	0.970
1.0	0.973	0.972
0.8	0.976	0.974
0.6	0.977	0.976
0.3	0.980	0.980
Zero	0.984	

“Soda-Lo” in bread



Texture

1.8% Soda-lo 20 salt (LHS) v 1.8% salt (RHS)



0.3% Soda-lo 20 salt (LHS) v 0.3% salt (RHS)

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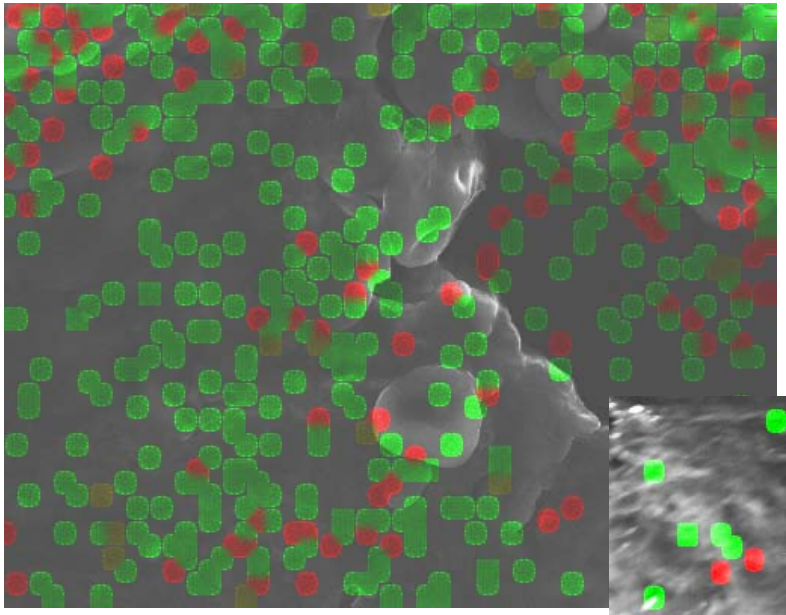
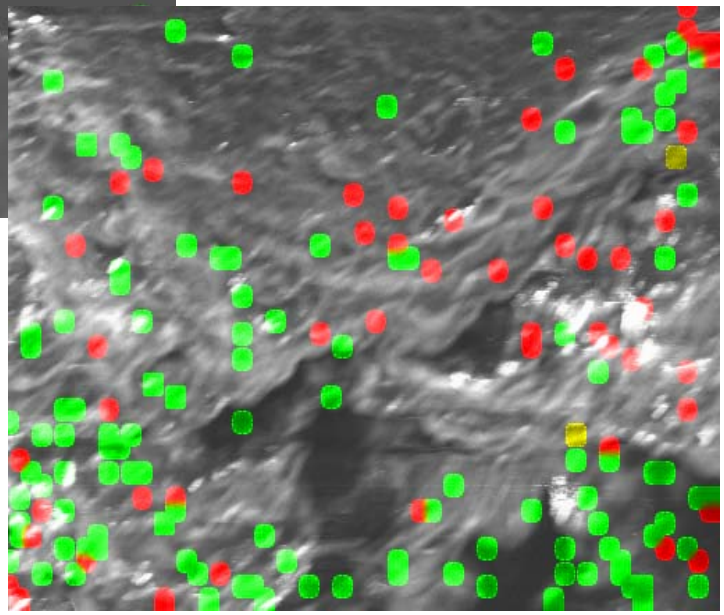
Distribution of Salt and “Soda–Lo” in baked bread



Bread made with “Soda-Lo”

EDAX images of bread,
Green = Chlorine
Red = Sodium
High magnification



Bread made with normal salt

Soda-Lo 20 in Bread

- Large bakery made some bread with Soda-Lo 20, normal salt and brine.
- Eminate analysed this bread, looking at:
  - Moisture content
  - Sodium and chloride distribution
  - structure

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Moisture Content

WEIGHT IN GRAMS	PRODUCTS	PERCENTAGE HUMIDTY		% CHANGE
		DAY1	DAY2	
2.025	SALT LOAF	44.85	43.15	-4
2.025	SODA - LO LOAF	45.19	44.53	-1
2.025	BRINE LOAF	45.66	40.77	-11

Distribution of sodium and chloride

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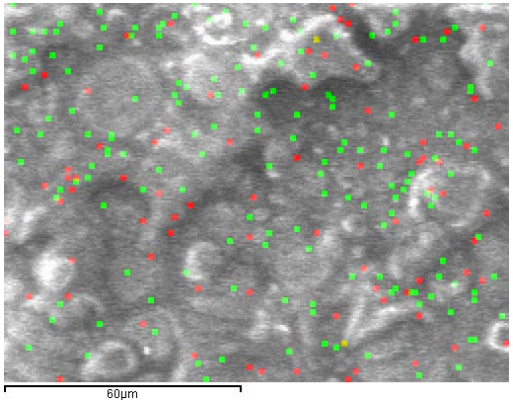
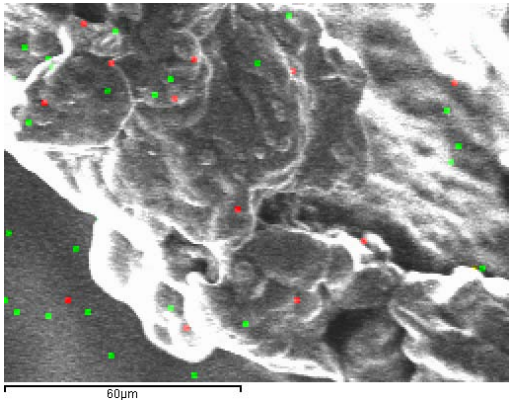
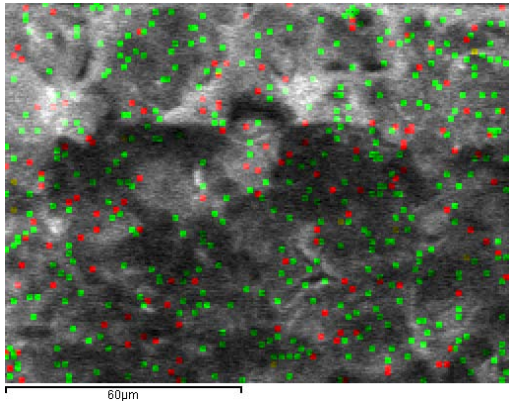
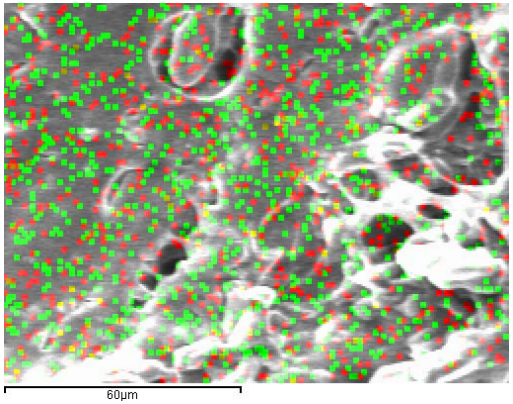
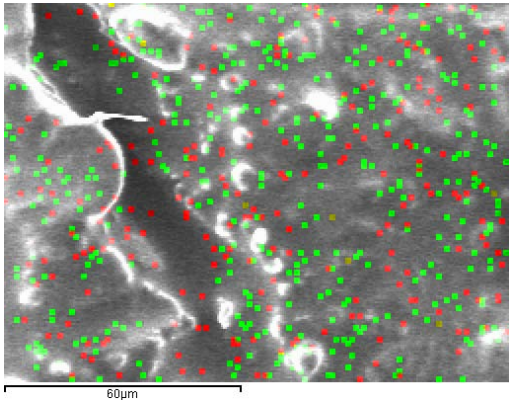
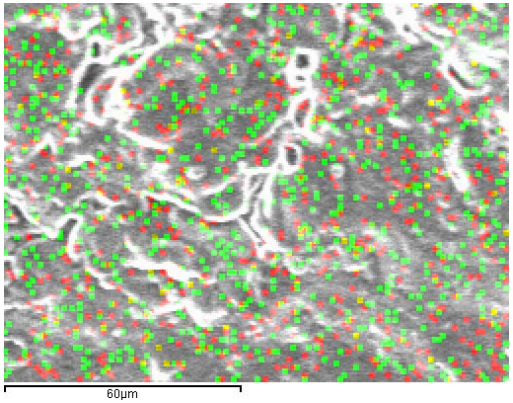
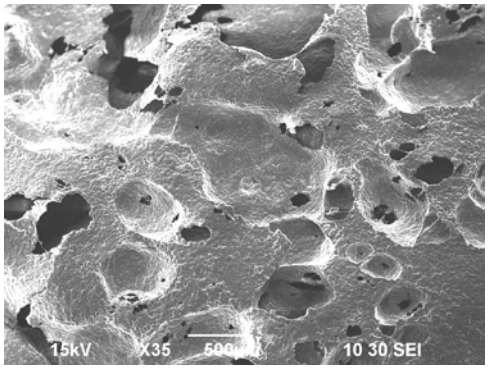
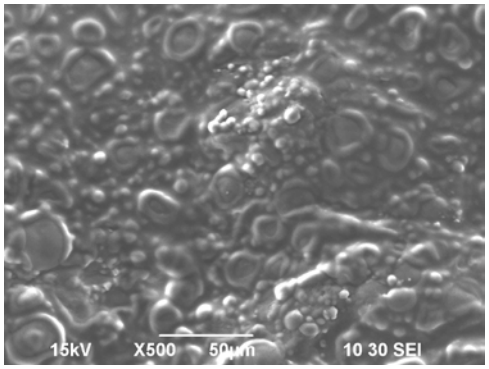
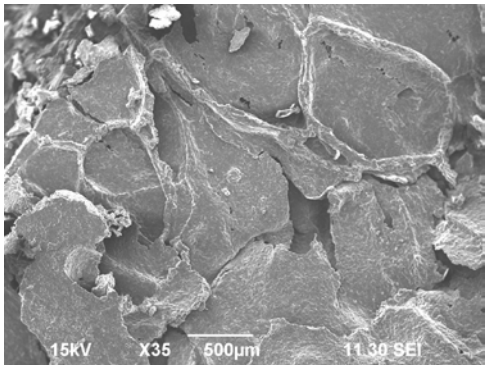
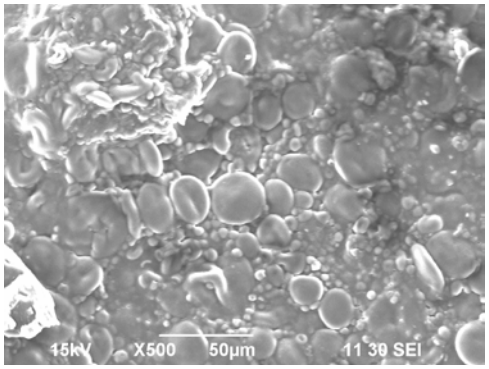
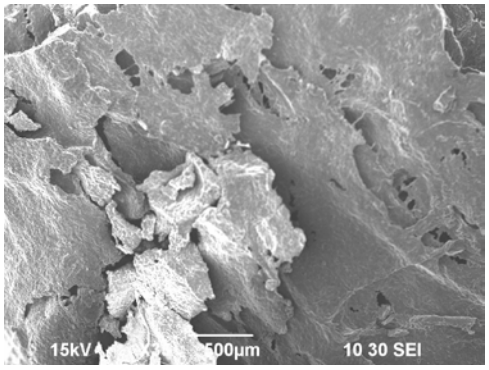
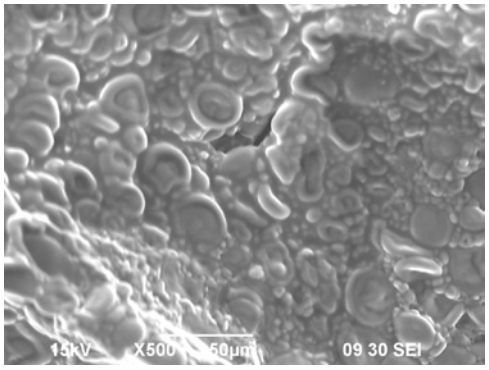
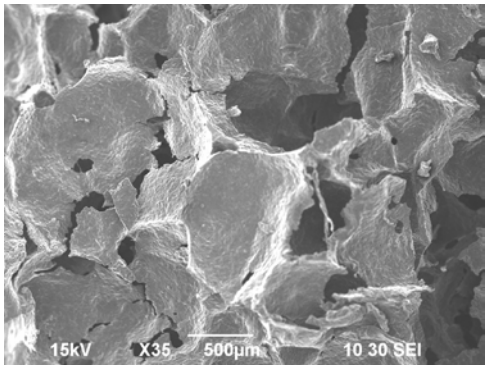
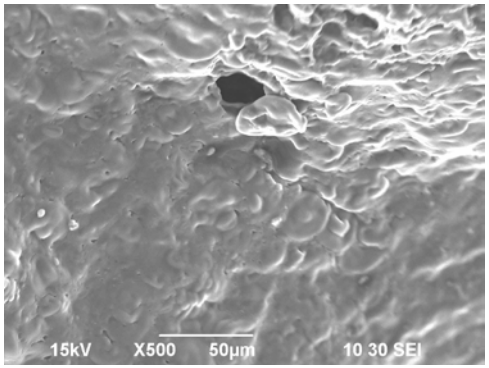
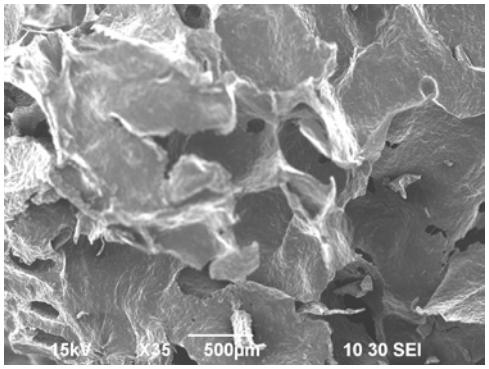
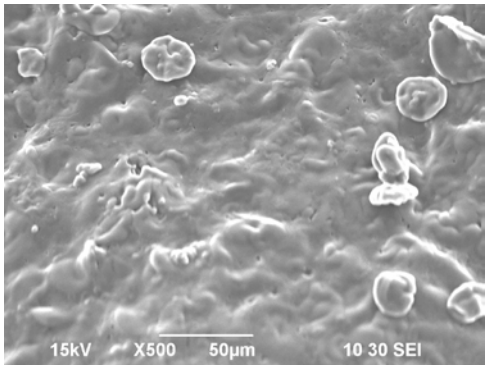
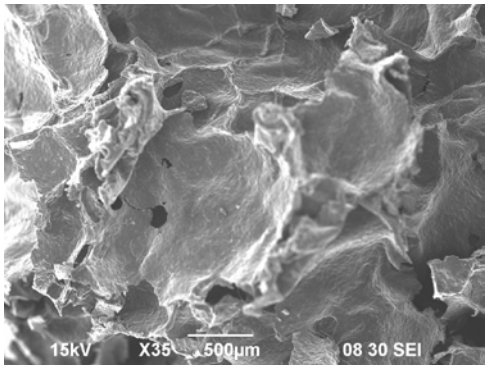
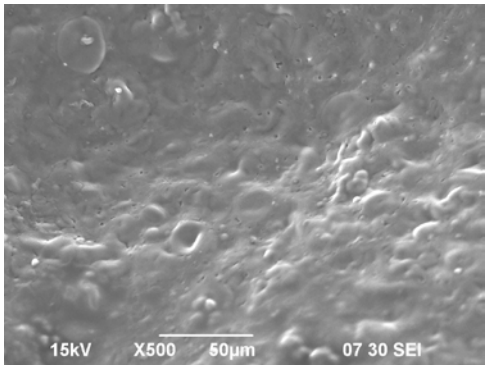
Cl = RED Na= GREEN

	Crust	Inside
Salt		
Brine		
Soda-Lo 20		

Structure Crust

	X35	X500
Salt		
Brine		
Soda-Lo 20		

Structure Inside

	X35	X500
Salt		
Brine		
Soda-Lo 20		

Soda-Lo in Cakes

- Eminate baked cakes using a bread maker.
- They contained Soda-Lo 20, 30 and normal salt at various levels.
- They also contained eminate Sodium bicarbonate at various levels
- Eminate analysed these cakes, looking at:
  - Moisture content
  - Sodium and chloride distribution
  - structure

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Moisture Content

Cake Type	Cake Height cm	Cake Moisture test Weight	Cake Moisture after 24 hrs %	Cake Moisture after ~48 hrs %	% change	Taste Ranking
100% Table Salt, 100% Bicarb.	9.2	2.031 g	35.88 %	35.23 %	- 0.65%	5th
50% Table Salt, 100% Bicarb.	9.1	2.028 g	35.18 %	34.21 %	- 0.97%	3rd
100% Soda-Lo 20, 100% eminate Bicarb.	9.2	2.025 g	33.12 %	34.61 %	+ 1.49%	4th
50% Soda-Lo 20, 100% eminate Bicarb.	9.2	2.025 g	34.59 %	34.80 %	+ 0.21%	6th
100% Soda-Lo 30, 100% eminate Bicarb.	9.1	2.025 g	33.60 %	32.12 %	- 1.48%	2nd
50% Soda-Lo 30, 50% eminate Bicarb.	9.0	2.028 g	34.54 %	24.69 %	- 9.87%	1st

Distribution of sodium and chloride

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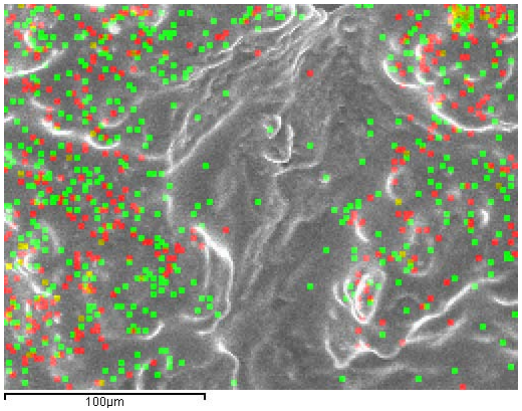
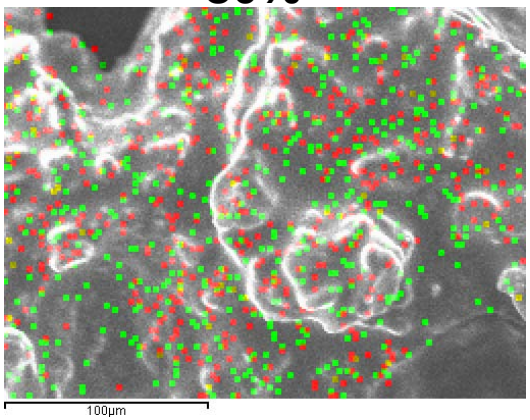
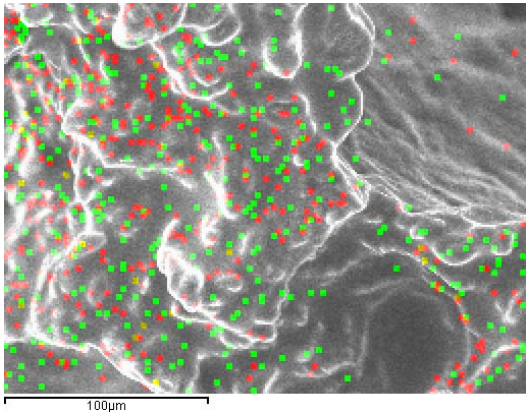
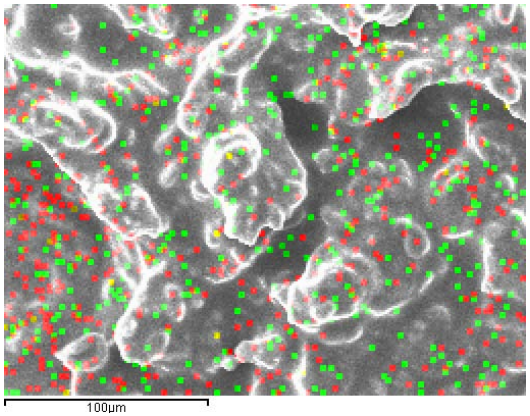
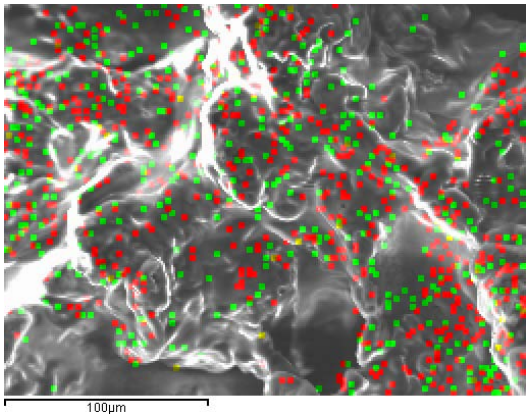
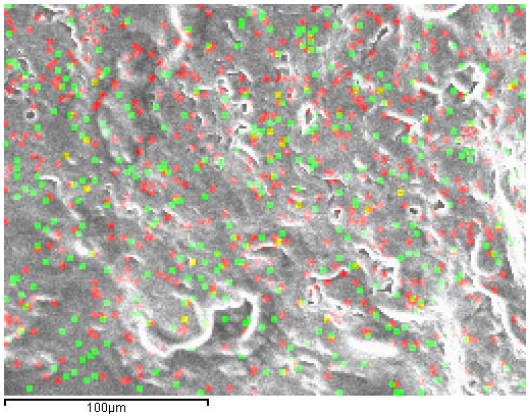
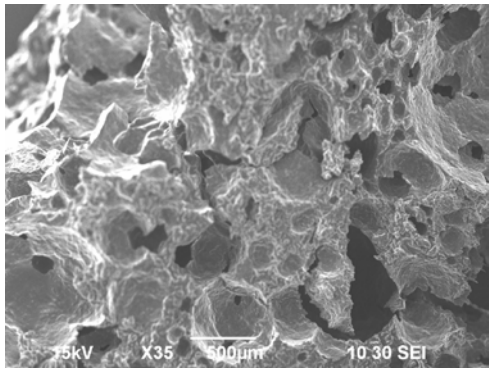
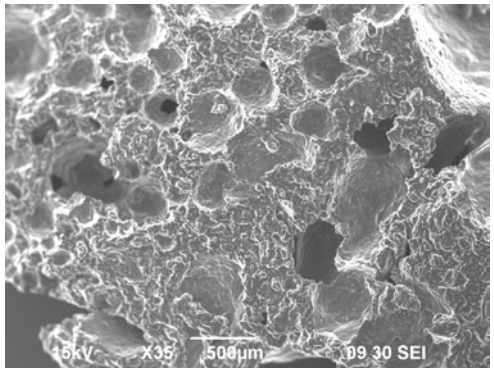
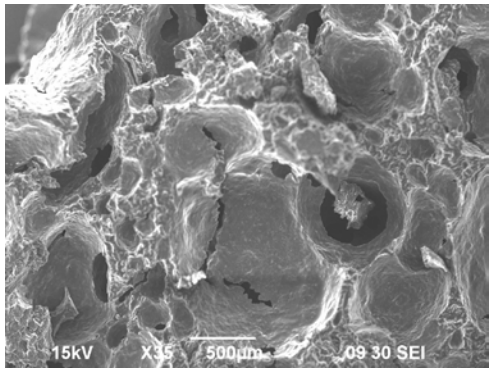
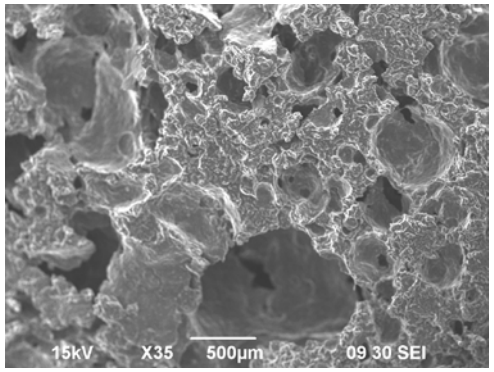
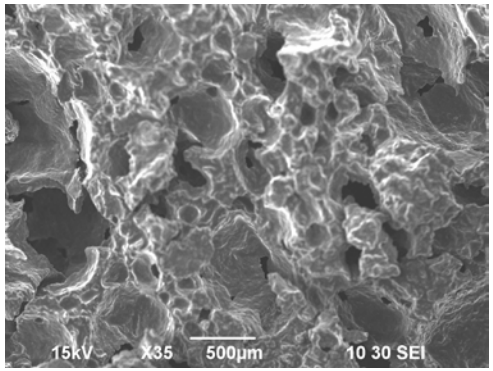
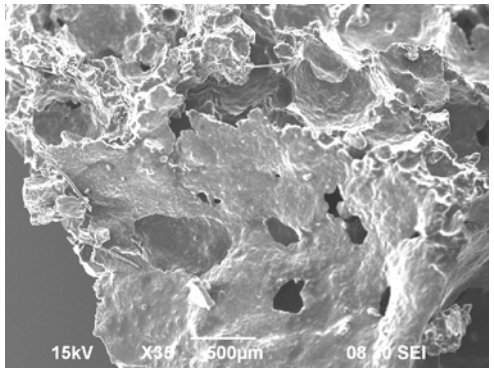
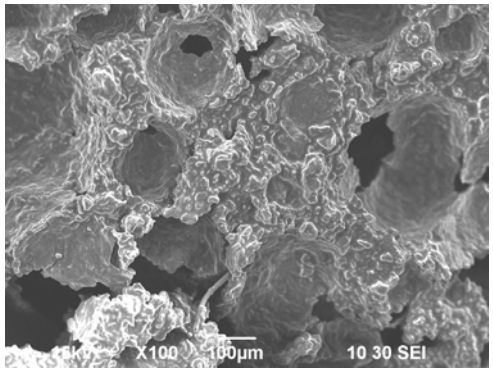
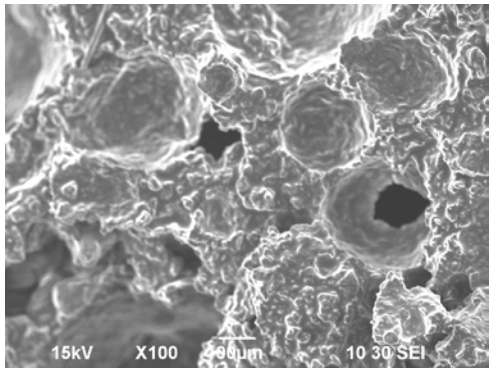
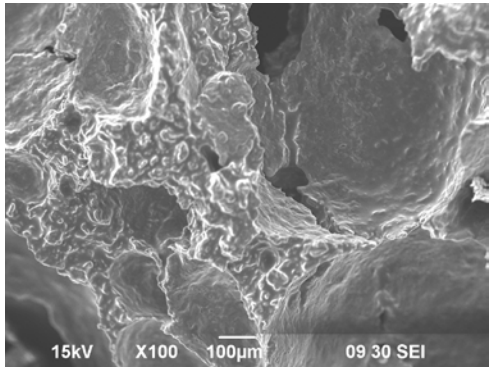
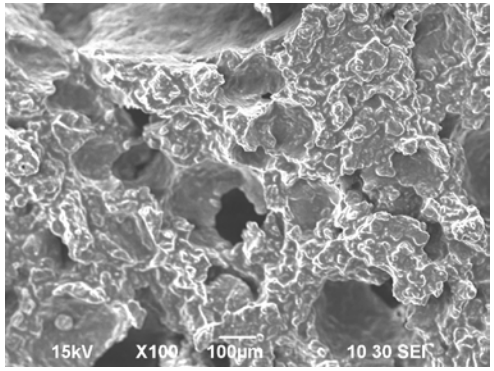
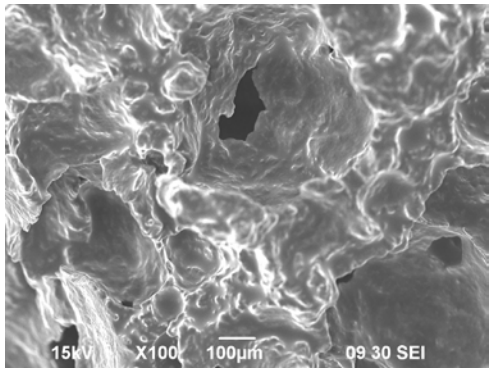
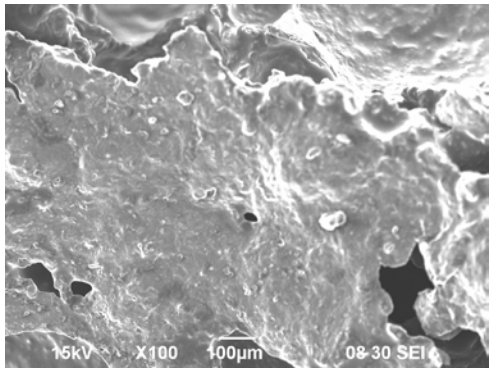
Cl = Green Na= red

	100%	50%
Salt		
Soda-lo 20		
Soda-Lo 30		

Structure x35

	100%	50%
Salt		
Soda-lo 20		
Soda-Lo 30		

Structure x100

	100%	50%
Salt		
Soda-lo 20		
Soda-Lo 30		

Cakes – Internal Taste Test

Cake	Taste comments	Ranking
Normal 100% table salt 100% normal Bicarb	Ok not very tasty	5th
Normal 50% Table Salt 100% Bicarb	Good overall flavour	3rd
Soda-Lo 20 100% salt 100% Bicarb	Reasonable overall flavour	4th
Soda-Lo 20 50% salt 100% Bicarb	Not good	6th
Soda-Lo 30 100% salt 100% Bicarb	Good overall flavour	2nd
Soda-lo 30 50% salt 50% Bicarb	Best cake, fluffy and good taste	1st

eminate
Innovative solutions for health

“Soda-Lo” – in Sausages

- 25% reduction enabled: traffic light label to move into “Amber” rather than “Red”.

Product Attributes

- No Potassium
- No yeast extract
- No peptide or nucleic acid
- **Clean Label**
- Free Flowing
- Superior flavor impact
- Ingredients: Sodium chloride