

# NATURAL CALCIUM CARBONATE


A sustainable and Multifunctional Solution for Oral Wellness Products



NEW YORK  
Society of Cosmetic  
CHEMISTS

# AGENDA

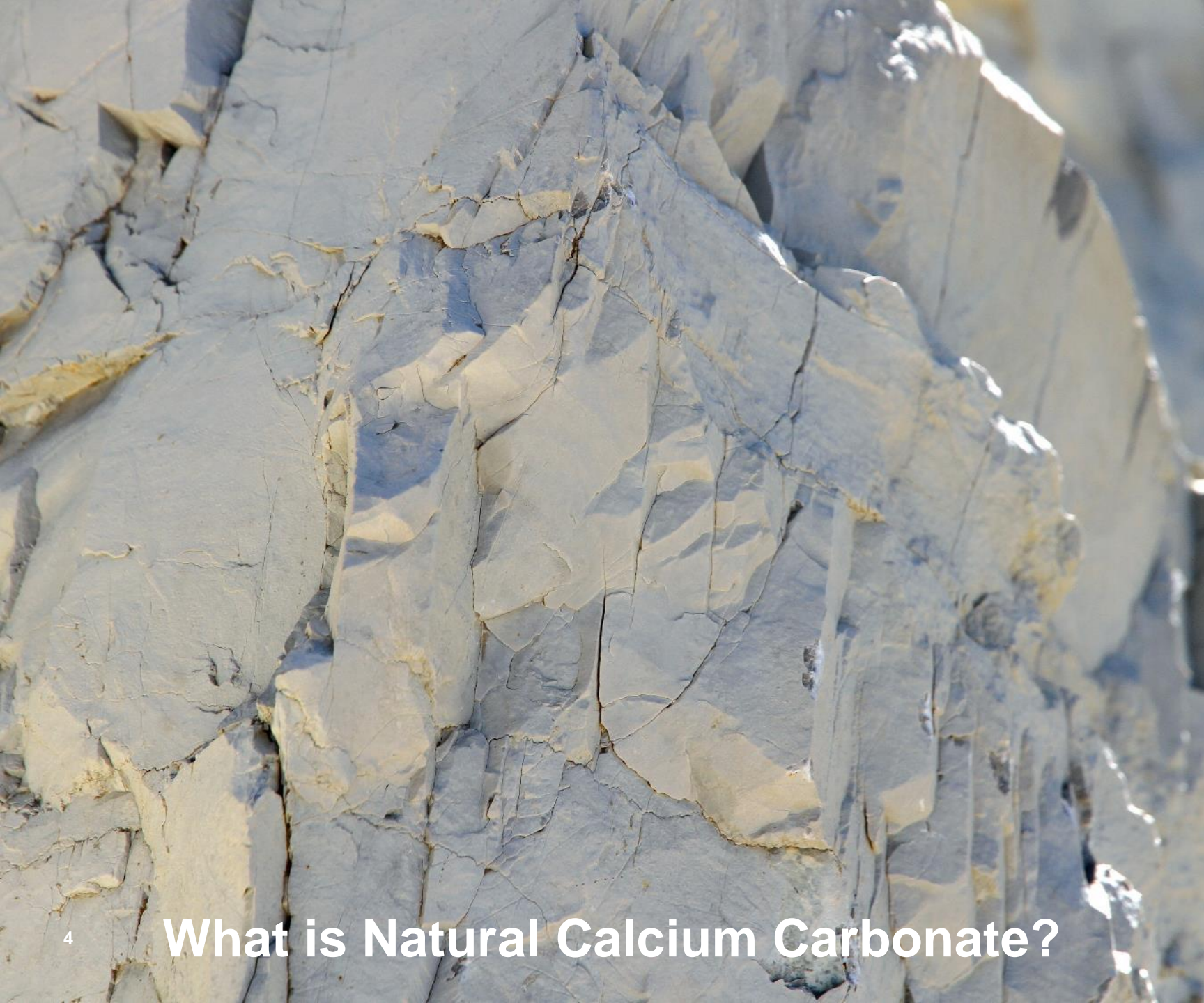
- What is Natural Calcium Carbonate?
- NCC as an Abrasive Particle
- Functionalization of NCC
- Applications in Natural Oral Care

A photograph of an industrial facility, likely a power plant or refinery, silhouetted against a bright orange and yellow sunset sky. Two tall smokestacks are prominent, each emitting a thick, dark plume of smoke that drifts across the sky. The foreground shows a body of water and some industrial structures. The overall mood is somber and industrial.

**70%** of people are more aware now than before COVID-19  
that human activity threatens the climate

Base: 3,249 Respondents; Source: BCG COVID-19 The pandemic is heightening environmental awareness

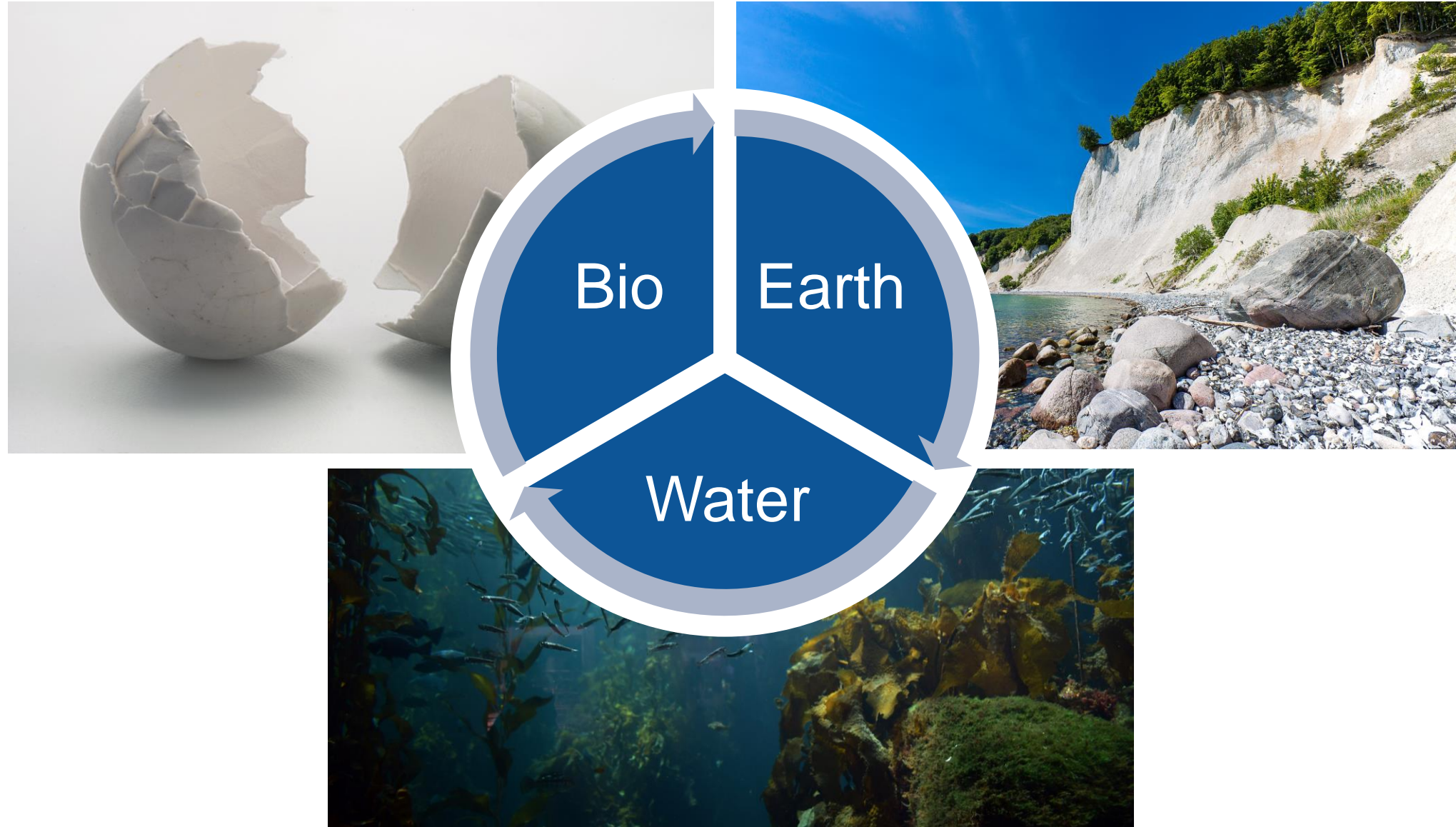




## What is Natural Calcium Carbonate?



# Calcium Carbonate ( $\text{CaCO}_3$ )



# Mineral Calcite ( $\text{CaCO}_3$ )



## Chalk

- Poorly compacted
- Incomplete diagenesis



## Limestone

- Sedimentary rock



## Marble

- Metamorphic rock
- Formed under high pressure and temperature







# Abrasive Particles for Oral Hygiene

- Aid in cleaning the teeth
- Must be **SAFE** and **EFFECTIVE**
  - Chemical Composition / Toxicity
  - Abrasion ( $RDA < 250$ )
  - Cleaning Efficiency ( $PCR > 50$ )
- Silica and Calcium Carbonate are the most common abrasives in oral hygiene products





# Environmental Impact

## Natural Calcium Carbonate

- Grinding/Milling
- 54.2 kg CO<sub>2</sub> eq.<sup>1</sup>

## Precipitated Calcium Carbonate

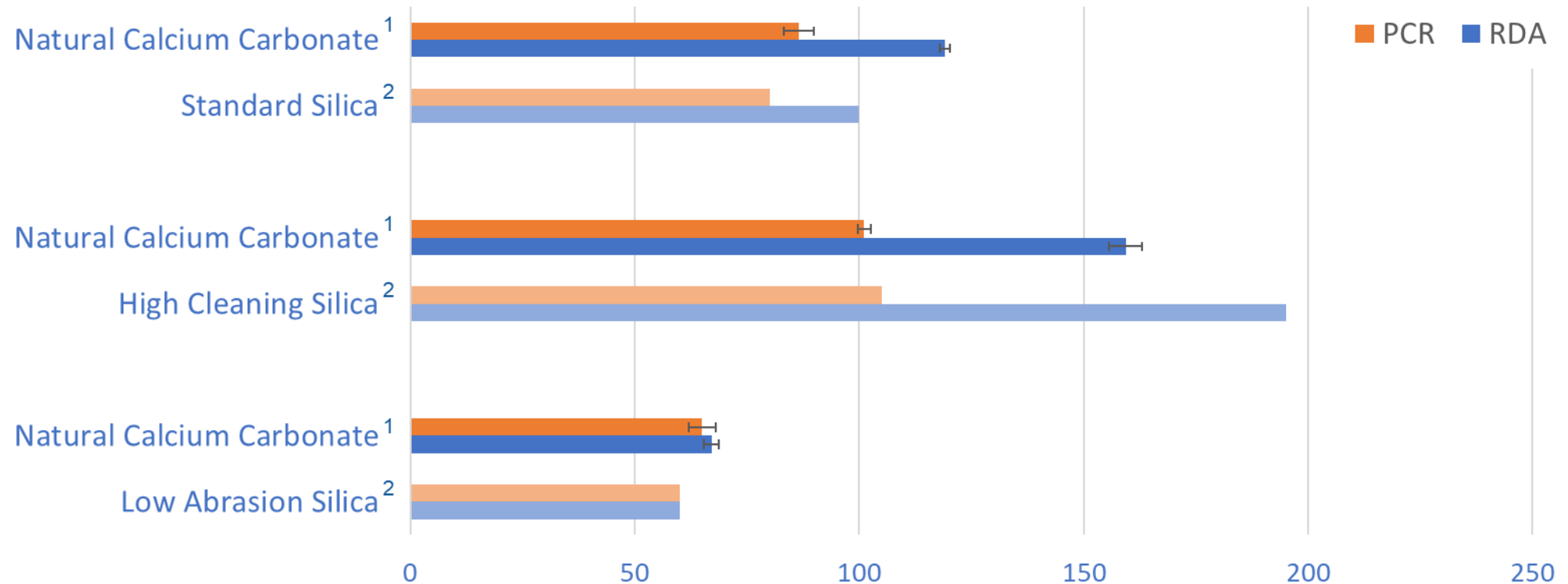
- Precipitation
- 629 kg CO<sub>2</sub> eq.<sup>1</sup>

## Synthetic Amorphous Silica

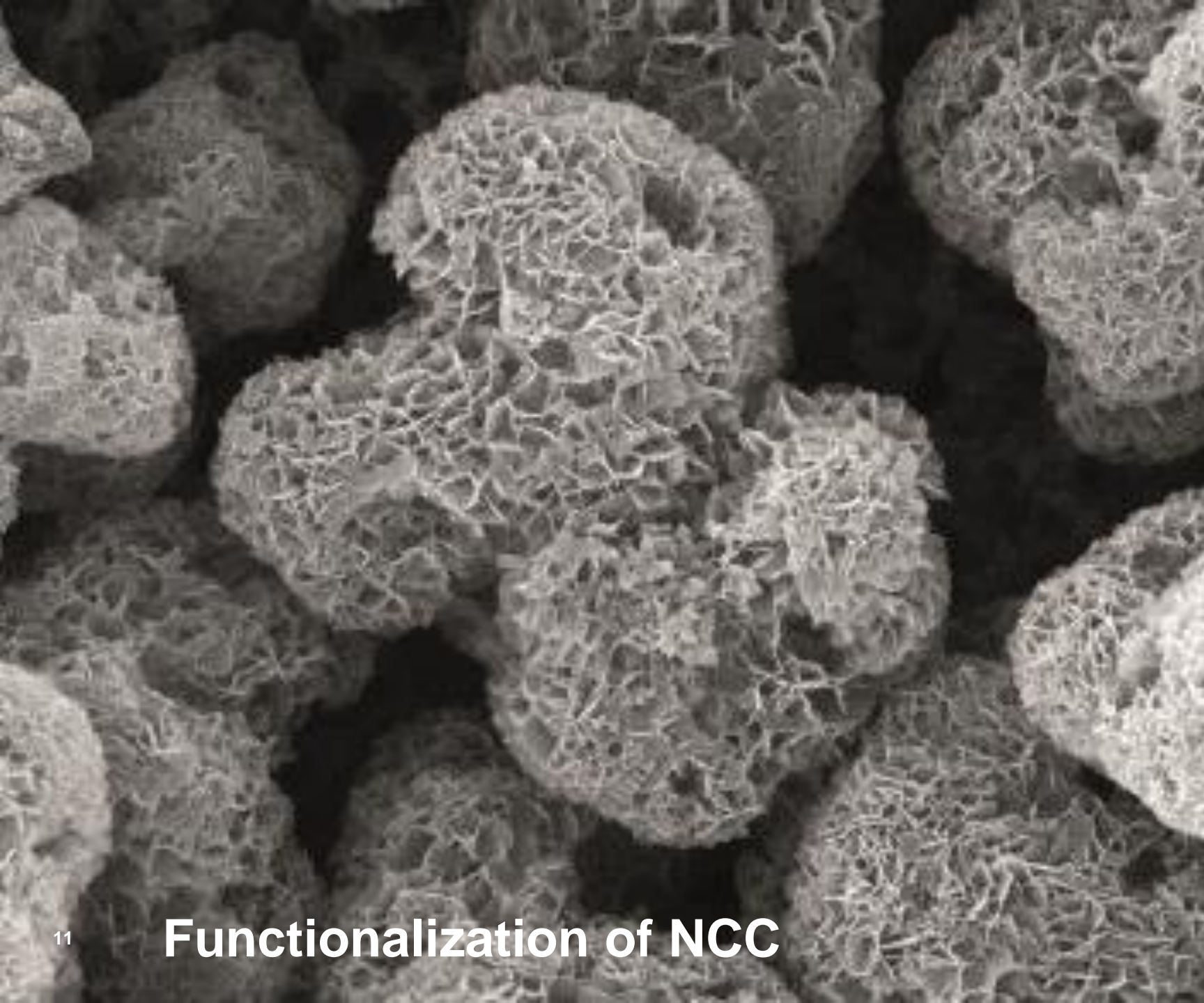
- Precipitation
- 1000 kg CO<sub>2</sub> eq.<sup>2</sup>

★ NCC is less processed and has a much lower carbon footprint

# Toothpaste abrasive

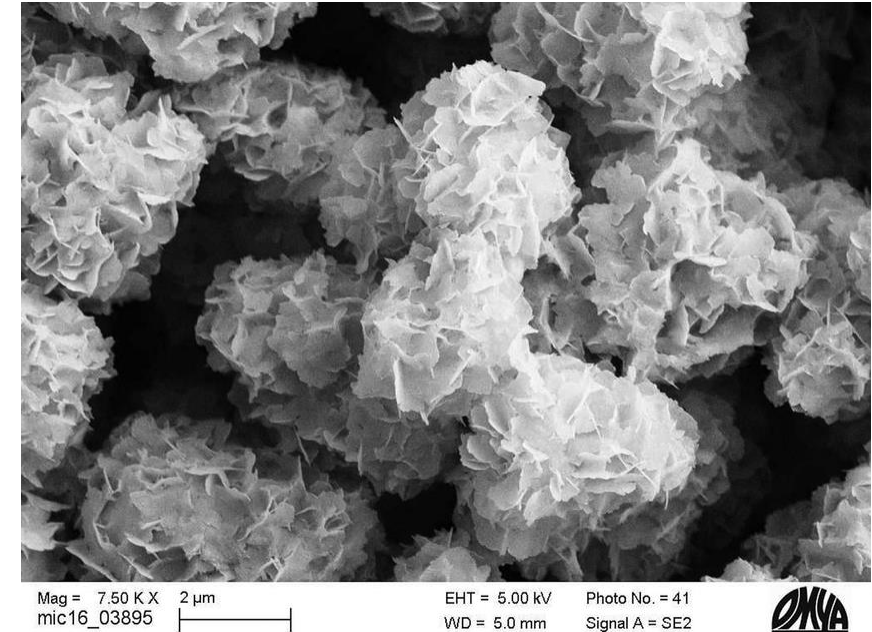
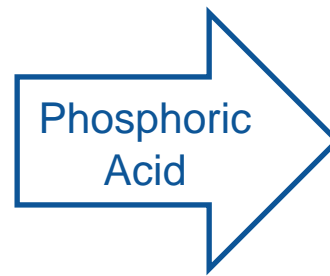
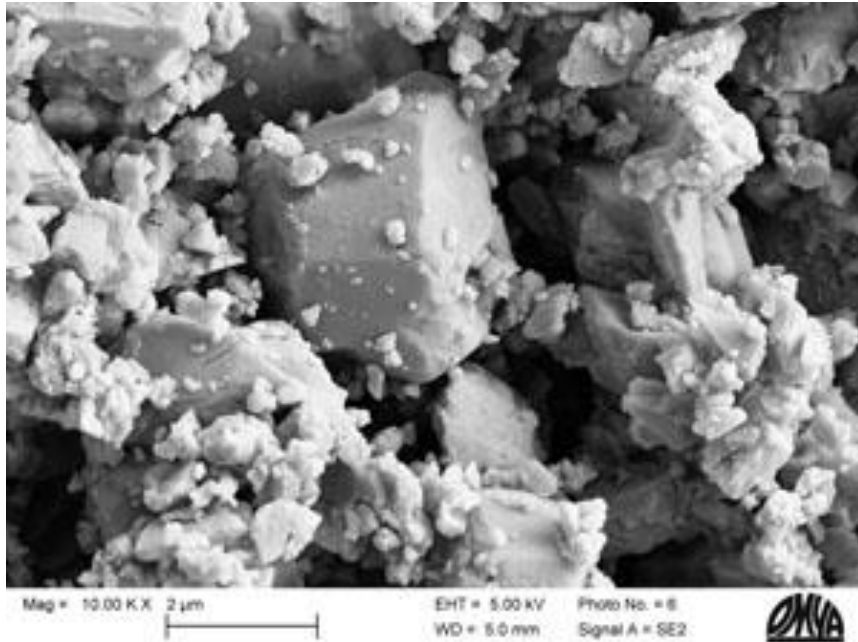


★ Stone selection and grinding process yield particles with a range of properties



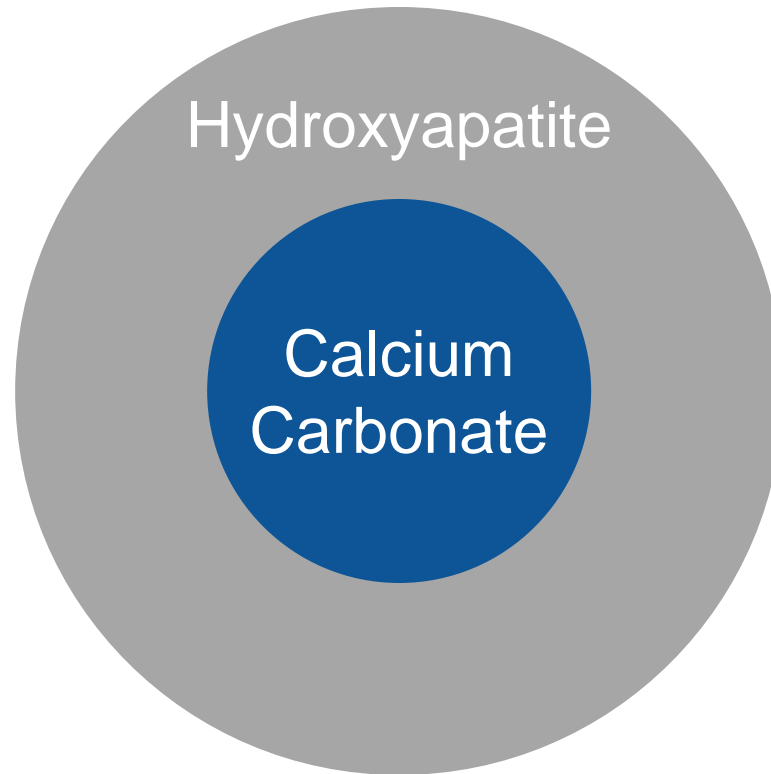


# Functionalization of Calcium Carbonate

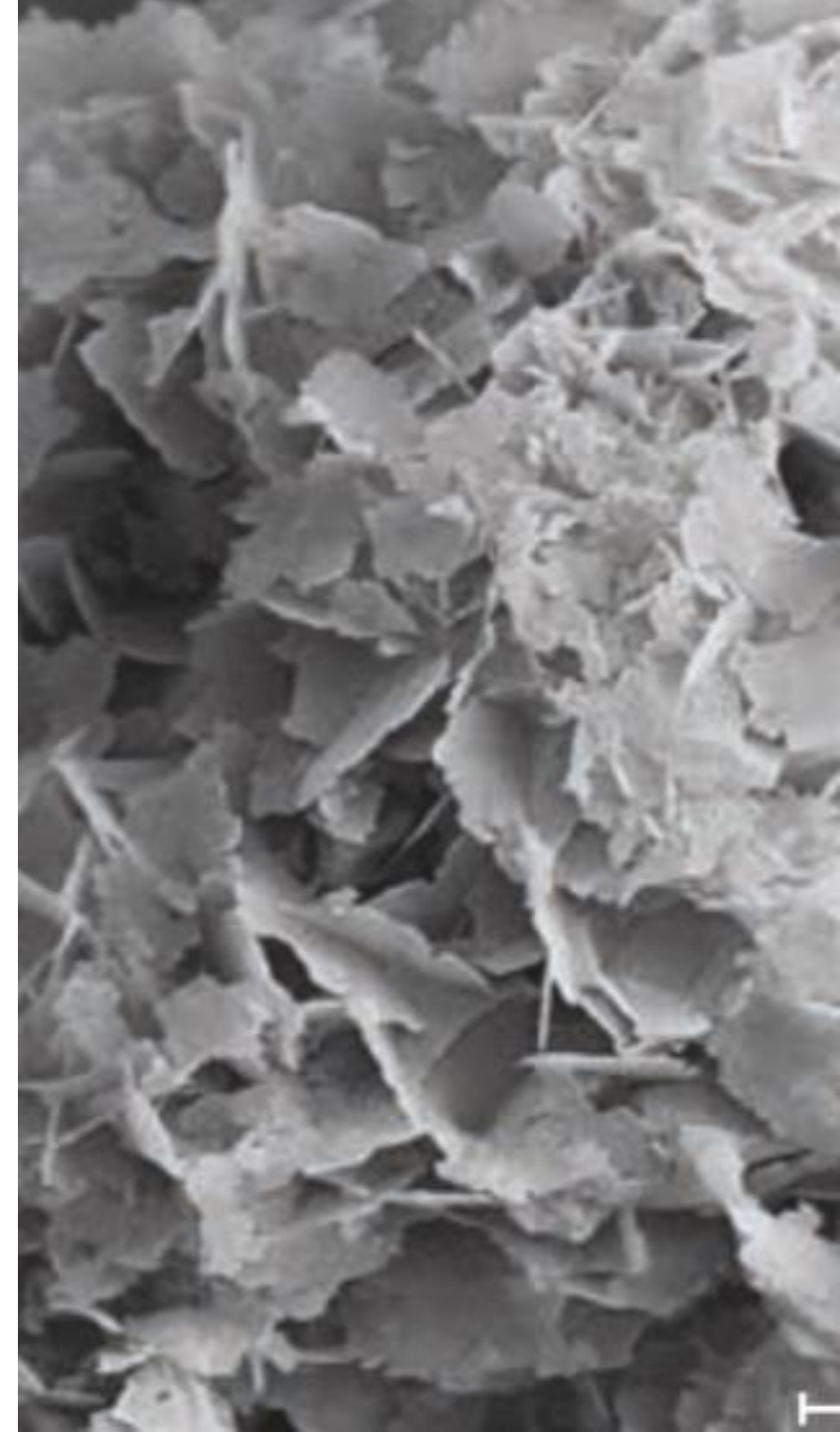


Proprietary treatment process with natural phosphoric acid creates a new functional particle

# Chemical Structure of FCC



Calcium carbonate cores remain, surrounded by highly porous lamellar sheets of hydroxyapatite



# Properties of FCC

- Chemical

- Highly bioavailable source of  $\text{Ca}^{2+}$  and  $\text{PO}_4^{3-}$
- Compressible

- Physical

- Adhere to tooth surface
- High porosity and BET surface area

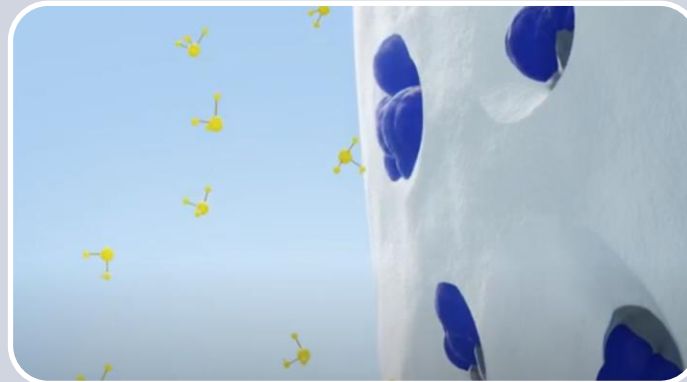
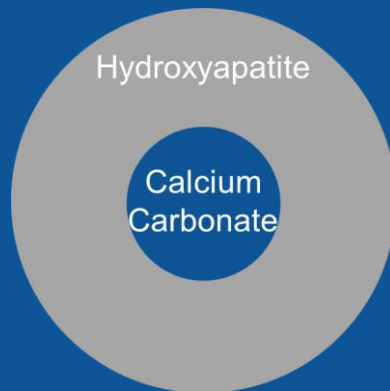
★ Reaction parameters can be modified to exploit specific properties



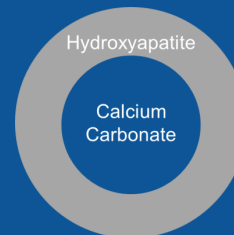
# Oral Wellness Benefits of FCC



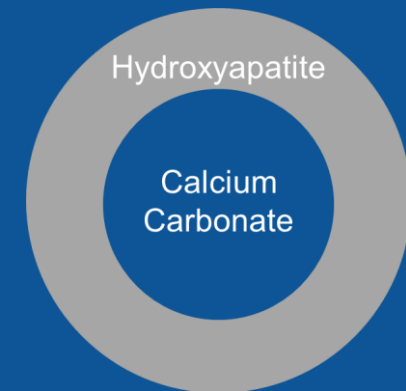
High HA FCC creates a reservoir of bioavailable  $\text{Ca}^{2+}$  and  $\text{PO}_4^{3-}$  ions for natural tooth remineralization



Small Particle FCC naturally occludes dentin tubules, creating a barrier against hypersensitivity



Compressible FCC for natural toothpaste tablets that quickly disintegrate during brushing





# Create a Robust Natural Toothpaste Portfolio with NCC & FCC

General	Whitening	Sensitive	Kids
<b>5% High HA FCC (for Remineralization)</b>	<b>5% High HA FCC (for Remineralization)</b>	<b>5% Small Particle FCC (for Sensitivity)</b>	<b>5% High HA FCC (for Remineralization)</b>
<b>35-45% Regular NCC</b>	<b>35-45% High Cleaning NCC</b>	<b>35-45% Low Abrasion NCC</b>	<b>15-30% Low Abrasion or Regular NCC</b>
20-40% Glycerin and/or Sorbitol			
3-10% Propanediol			
1-5% Natural Surfactants (Glucosides, Sodium Cocoyl Glutamate, etc.)			
0.5-2% Natural Gums (Xanthan, Carrageenan, Cellulose Gum, etc.)			
1-2% Natural Flavor / Essential Oils			
Natural Sweetener (Stevia, Xylitol)			
<i>with or without Sodium Monofluorophosphate</i>			
<i>with or without Natural Colors and other Aesthetics</i>			

QS Water



# Natural Toothpaste Tablets

Toothpaste Tablets
30% Compressible FCC
10% Regular NCC
5% High HA FCC (for Remineralization)
3% Disodium Coocyl Glutamate
QS Mannitol
5% Microcrystalline Cellulose
15% Glyceryl Behenate
QS Natural Sweetener & Flavor



# THANK YOU

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