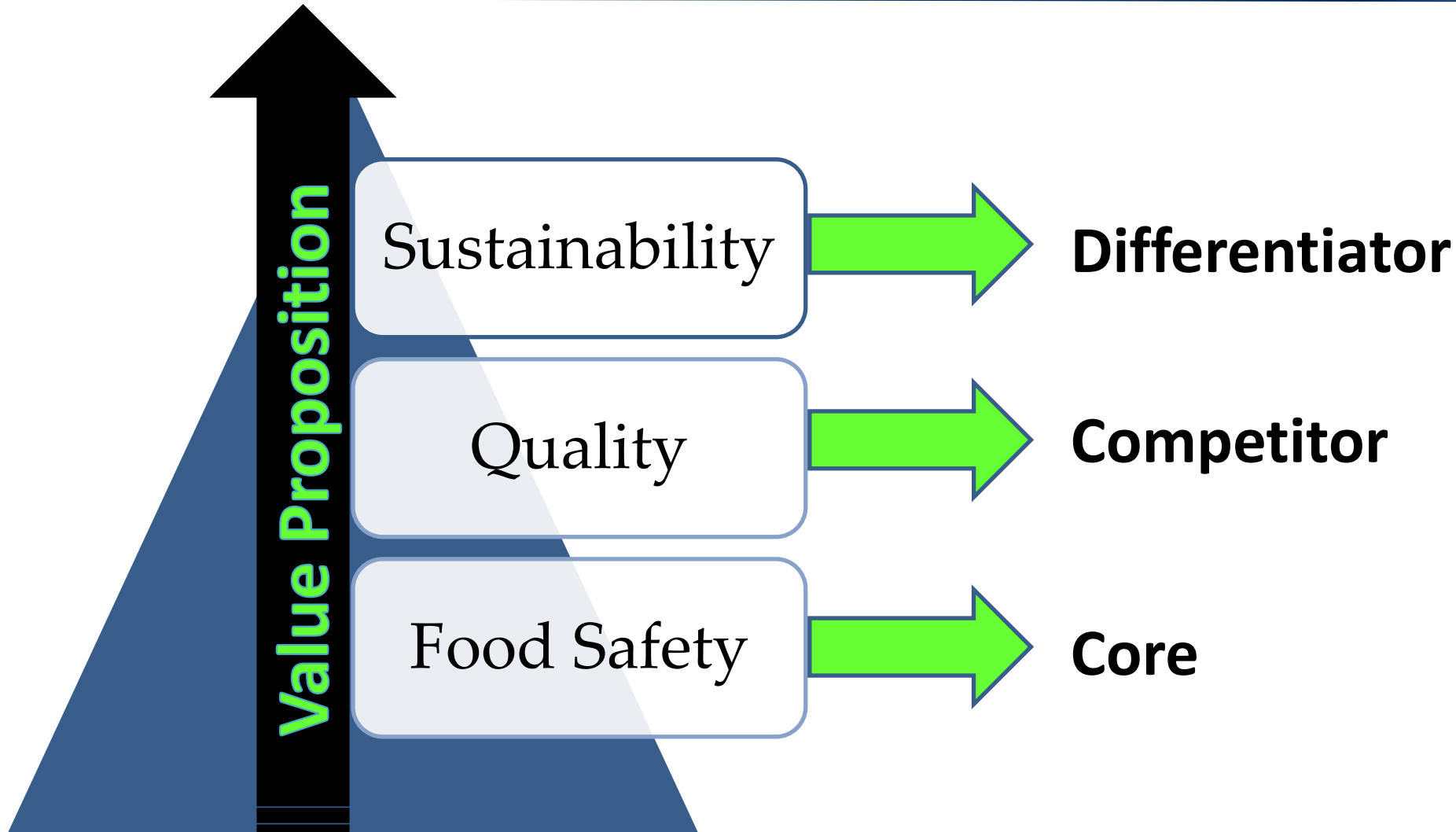


Opportunities for Using eBeam Technologies for Food Quality, Food Packaging and Valorization of Agricultural Waste

Shima Shayanfar, PhD
Herbalife Nutrition USA

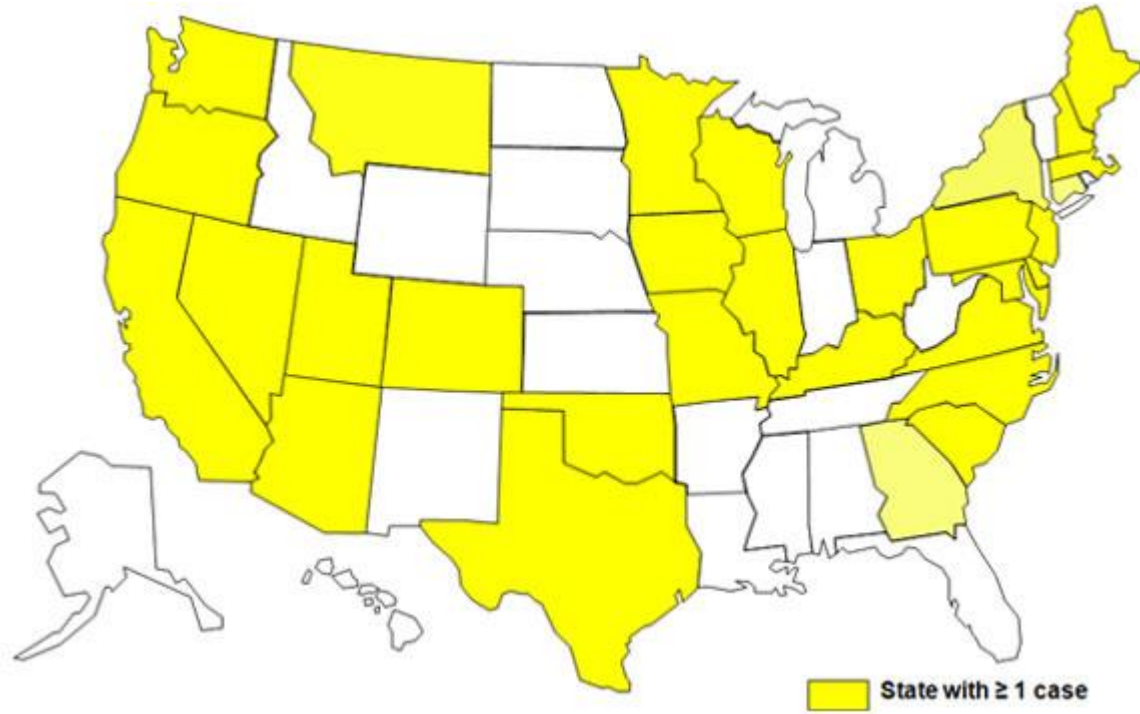
Key Components for Success in Food Industry Today



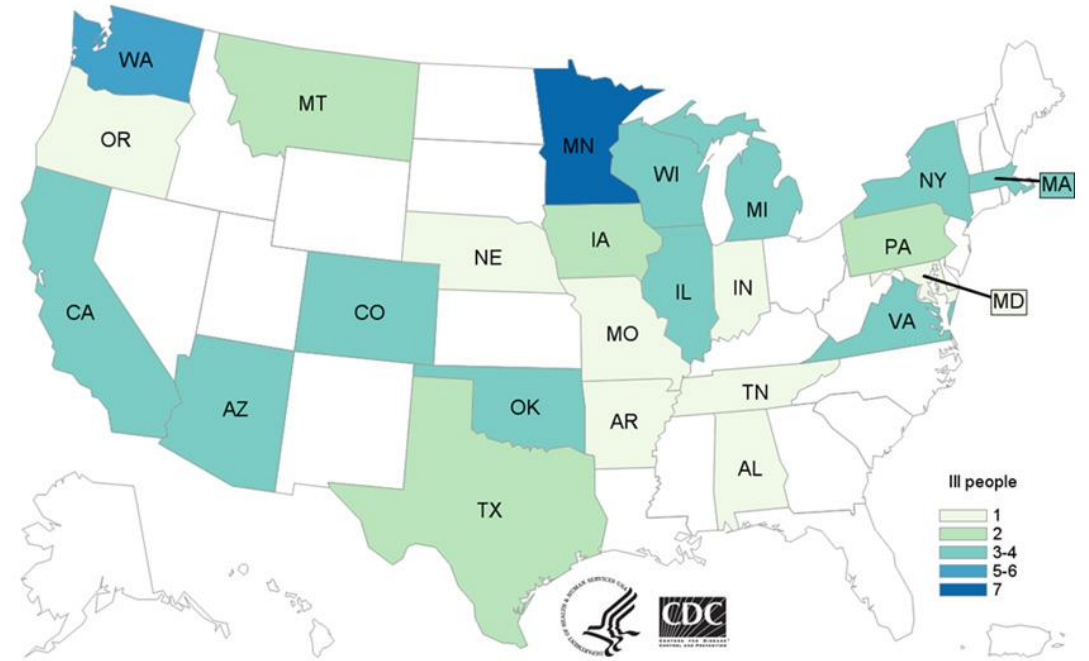
Farm to Flour – A Dreadful Journey



Nationwide FoodBorne Outbreaks



2009



2016



1/3 of Fresh Produce is Wasted in USA!



**As fresh as you can get!!!
Neither washed nor disinfected!**

[Reference: USDA, 2023](#)

How Can We Go Fresher, Tastier and Safer?



Current Fruit Prep

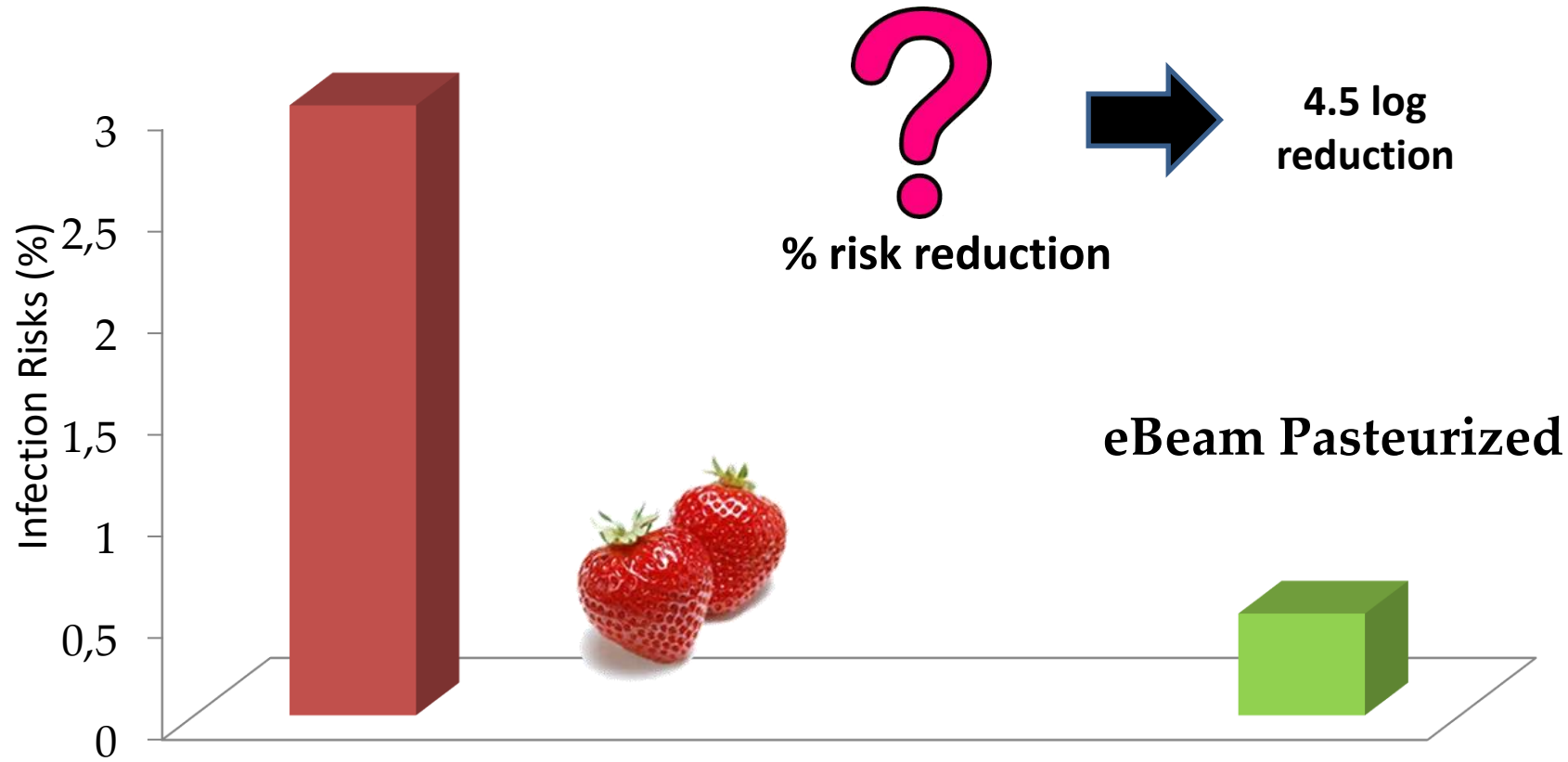
Overcooked

Not nutritious

Clean label as an emerging need

Risk Assessment of eBeam Treated Fresh Strawberries

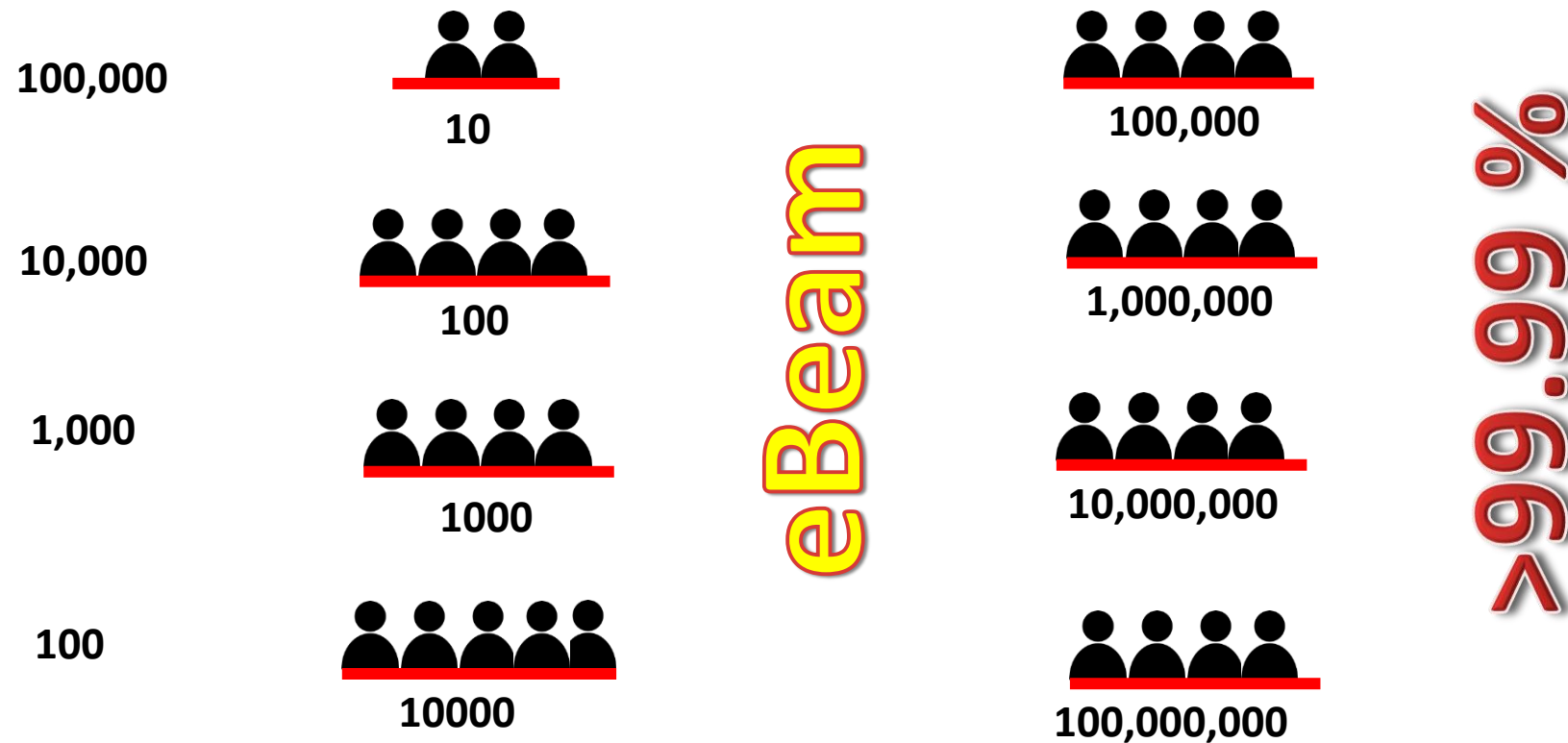
Serving size of strawberries (1 cup, (150 g)) contaminated 10^8 CFU of STEC treated with eBeam at < 1 kGy



Shayanfar et al., 2016

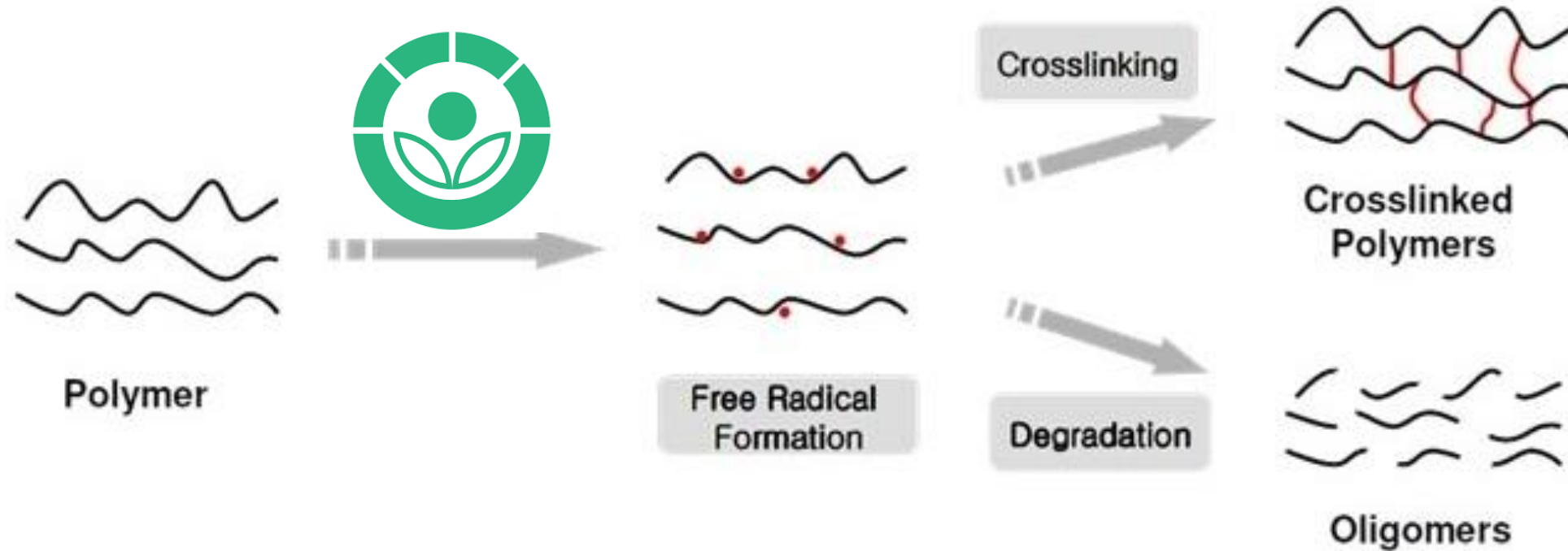
Risks of Infection Associated with Bacteria-Laden Strawberries Before and After Electron Beam Irradiation

E.coli concentration



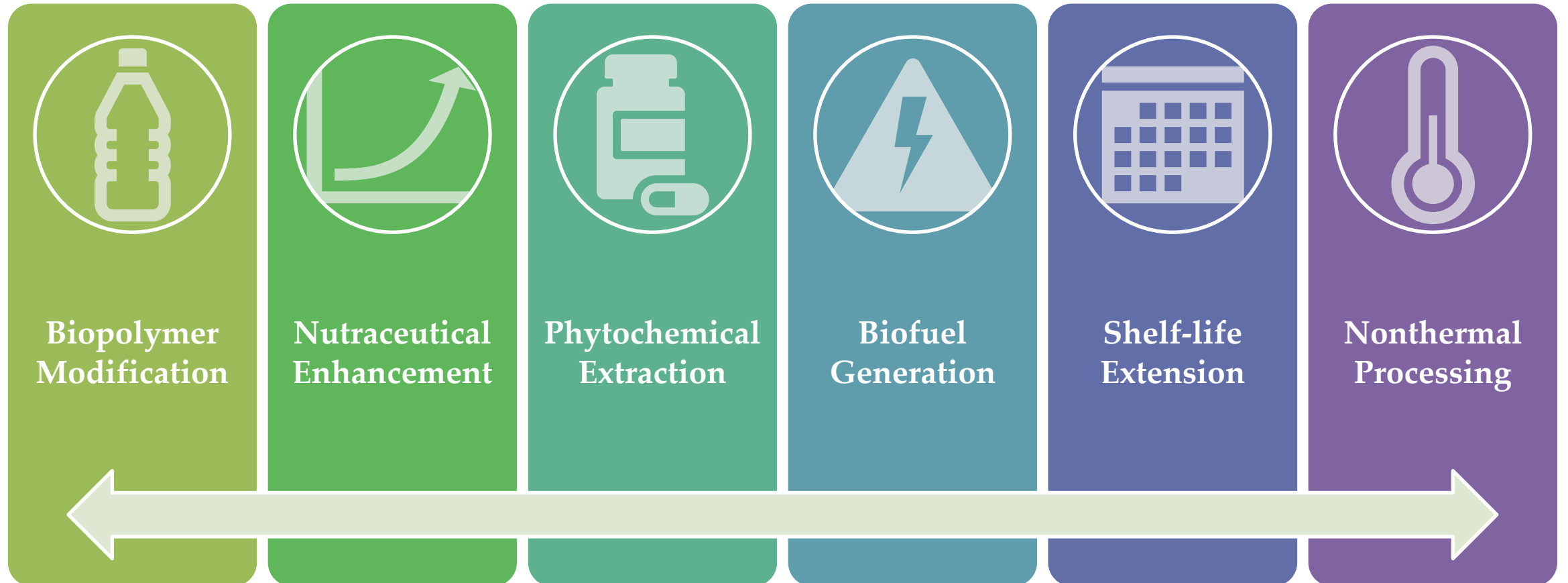
Shayanfar et al., 2016

eBeam for Polymer Modification



Salmieri et al., 2022

eBeam for Sustainability



Bio-Compounds Extraction

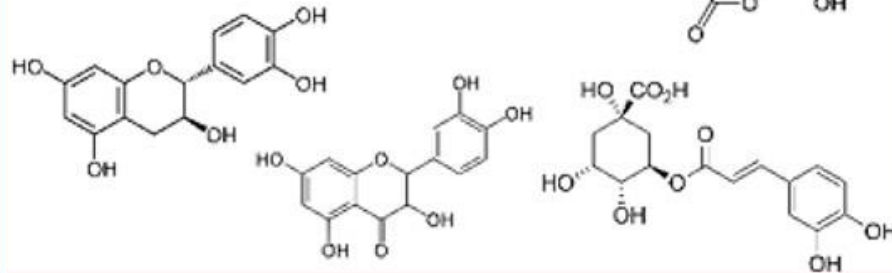
AGRO-INDUSTRIAL RESIDUES



IONIZING RADIATION

BIOACTIVE COMPOUNDS EXTRACTION

IMPROVEMENT OF
•BIOACTIVE COMPOUNDS EXTRACTABILITY
•ANTIOXIDANT ACTIVITY

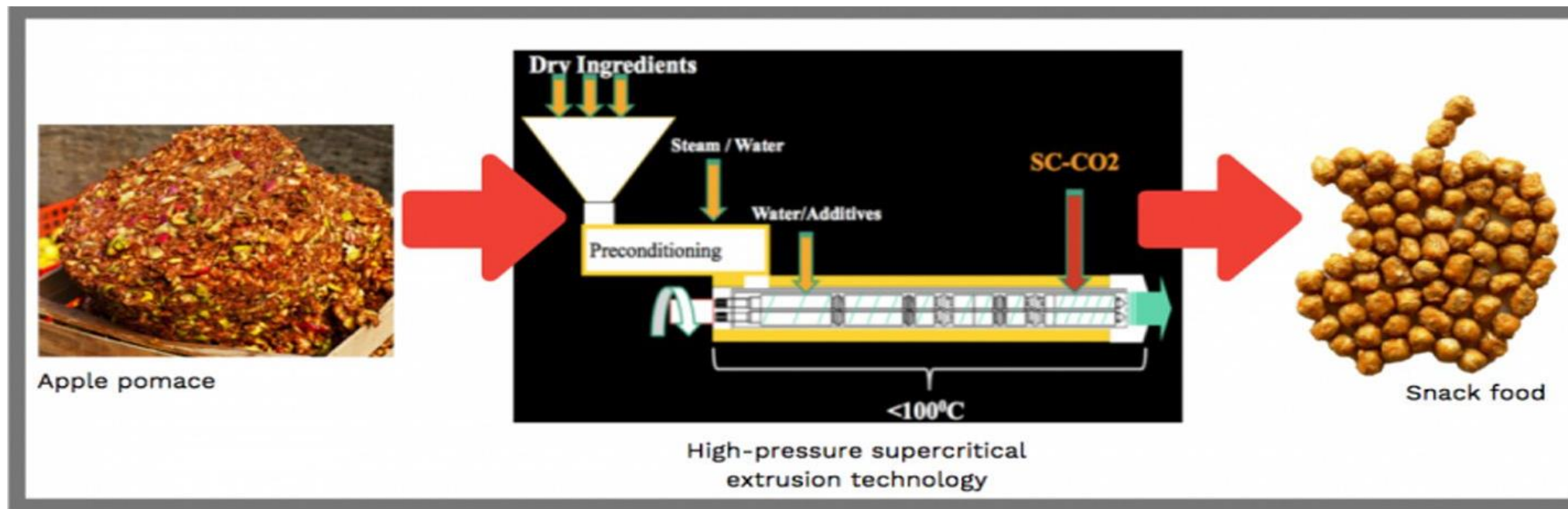


ADDED VALUE APPLICATIONS

- Pharmaceutical
- Food
- Cosmetic

Valorization of Agricultural Residues

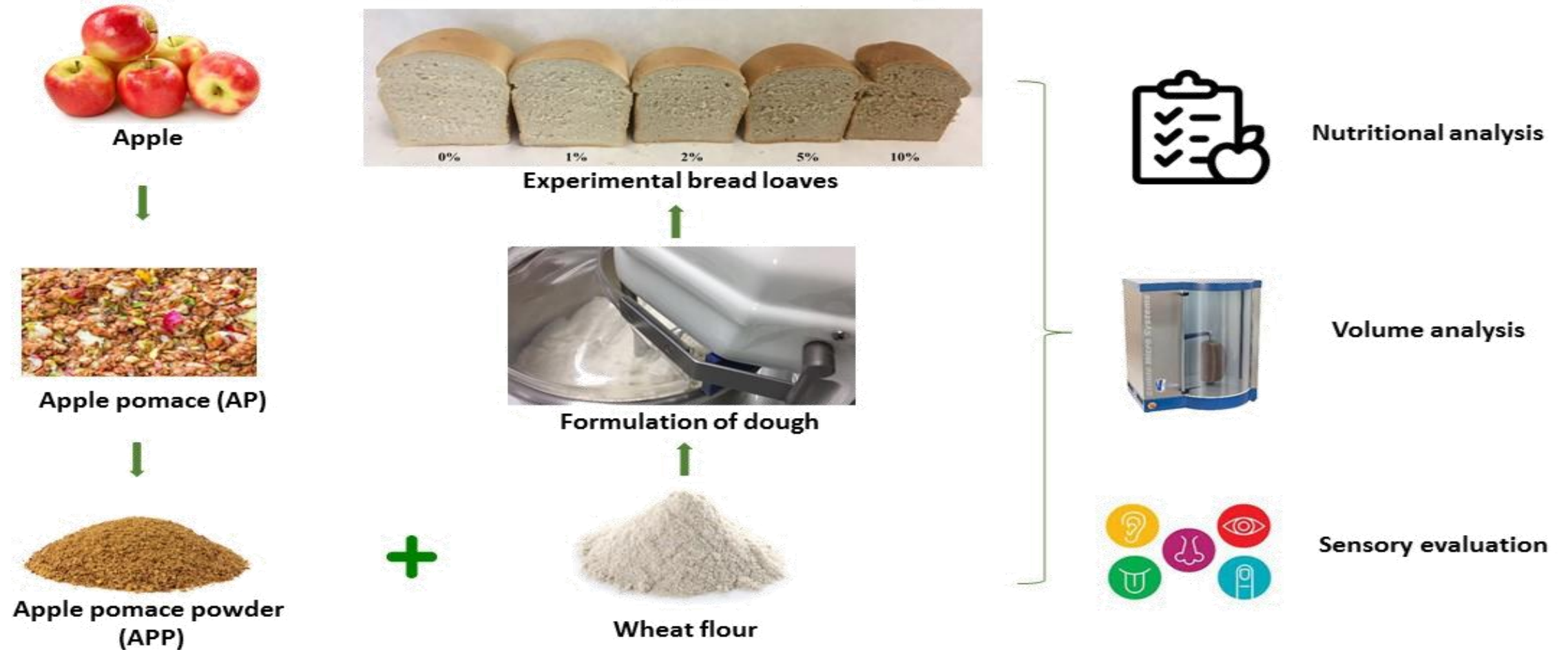
- Utilizing cheese/yogurt whey and fruit pomace to directly yield extruded, ready to eat products such as breakfast cereal, healthy snacks, protein puffs, nutrient bar.



[1499070099490980387-US20150282507A1 \(storage.googleapis.com\)](https://storage.googleapis.com/1499070099490980387-US20150282507A1)



Is This The Only Use of Agricultural Waste?



Valkova et al., 2022

Extracted Bio-Compound in Beauty/Fitness



Grape Skin 30% Polyphenol Extract - Herbal Extracts



\$14.41

Shipping calculated at checkout.

Size

- 1 +



SHARE ON

Grape Skin 30% Poly

1 Grape skin extract is a major source of polyphenols, which are natural antioxidants that help...

iHerb Shop Brands Help With New Specials! Try Best Sellers

Up to 40% off Bone & Joint! Shop Now

Brands A-Z > Nutriscology
Categories > Supplements > Digestive Support > Fiber



Nutricology, Dietary Fiber Cellulose, 8.8 oz (250 g)

By Nutricology

★★★★★ 208 Reviews | 2 & 5

In Stock

- Best By: March 1 2025
- Date First Available: May 30 2007
- Shipping Weight: 0.32 kg
- Product Code: ARG-52170
- UPC Code: 713947521704
- Package Quantity: 8.8
- Dimensions: 9.4 x 9.4 x 11.4 cm, 0.32

Product rank:

#102 in Fiber
#923 in Digestive Support

One-time purchase:
Our Price: **\$17.49** \$1.99/oz

- 1 +

Add to cart

FREE shipping over \$20

Autoship & Save: **\$16.62** (5% off)
5% off or highest discount + Free Shipping

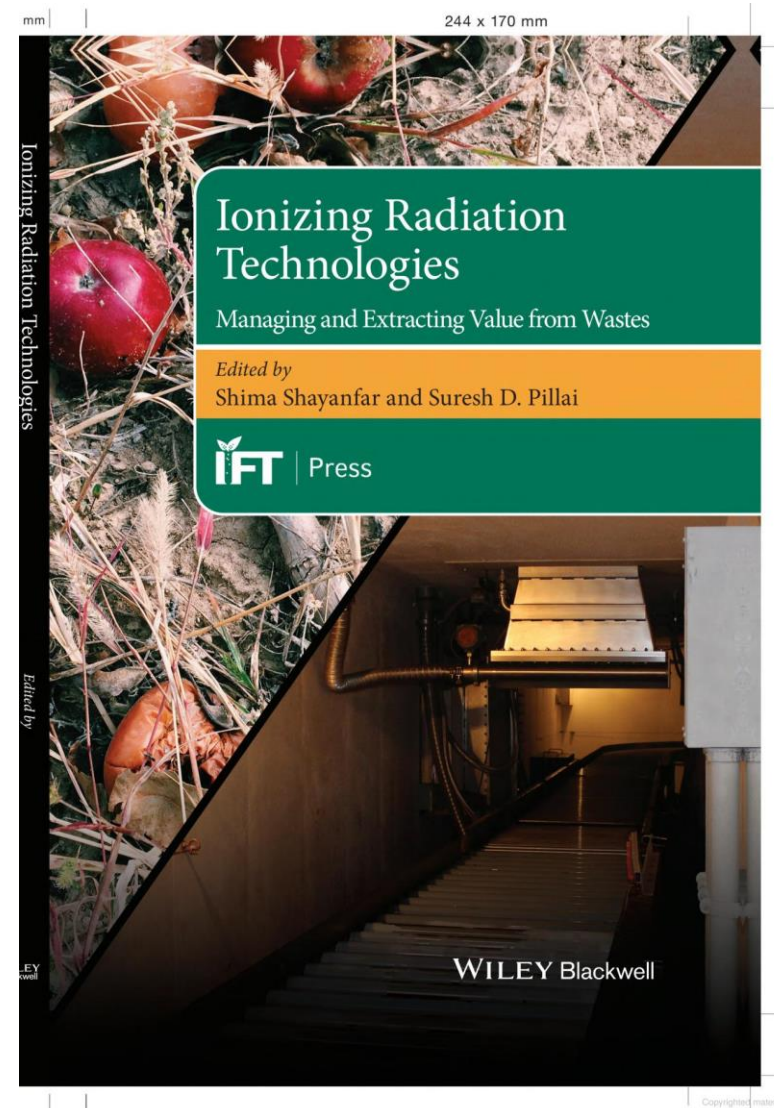
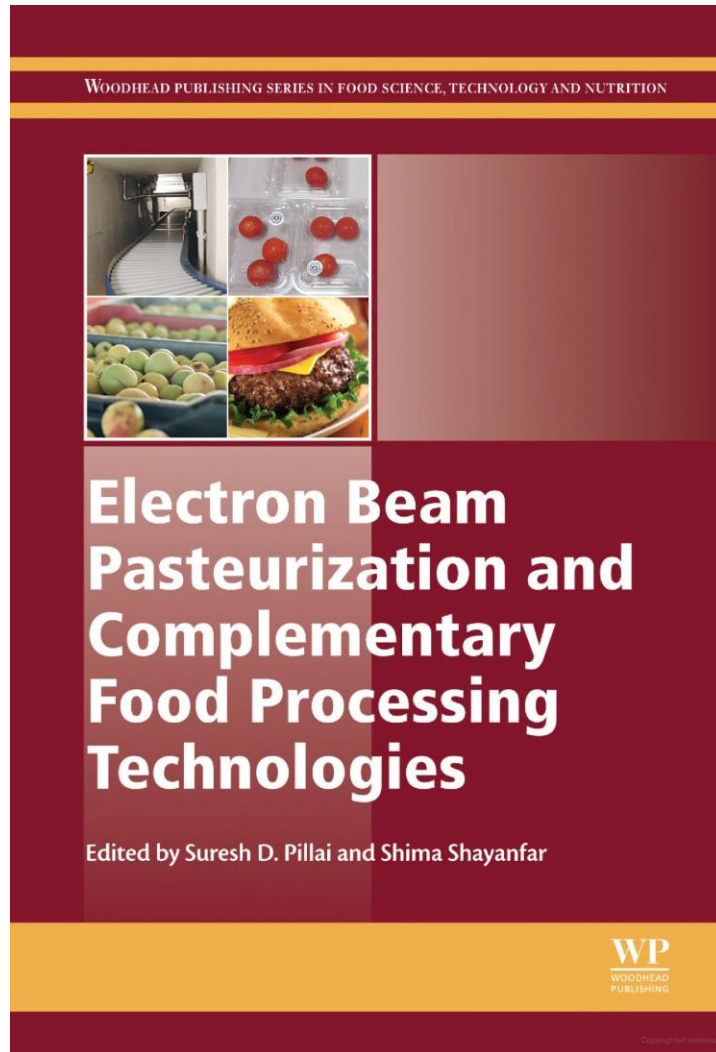
Bioethanol Yield Using Ionizing Radiation

Bioethanol yield from various agro waste pre-treated using ionizing irradiation method



Feedstock	Pre-treatment	Bioethanol Yield	References
Rice straw	eBeam	57%	<i>Bak, 2014</i>
<i>Miscanthus</i>	eBeam	96%	<i>Yang et al., 2015</i>
Empty Fruit Bunches	eBeam	5.36%	<i>Dahnum et al., 2017</i>
Sugarcane baggase	Gamma	47.7%	<i>Abdelhafez et al., 2015</i>
Potato peel	Gamma	44.6%	<i>Abdelhafez et al., 2015</i>

Interested to know more?



What is the future of food industry like?

Thank you

shimas@herbalife.com

Simple

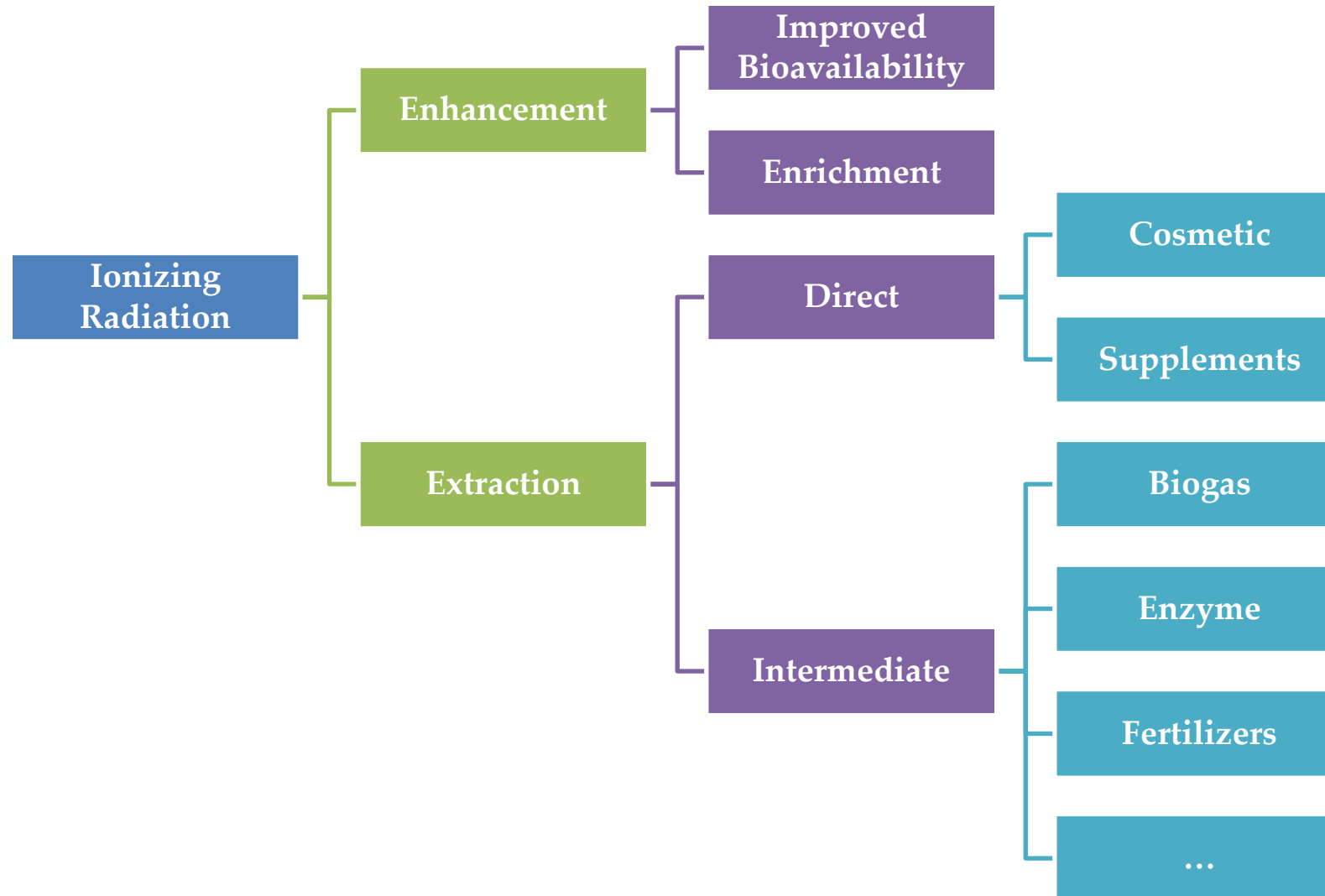
Transparent

Customized

Versatile

Sustainable

eBeam for Enhancing/Extracting Bioactive Compounds

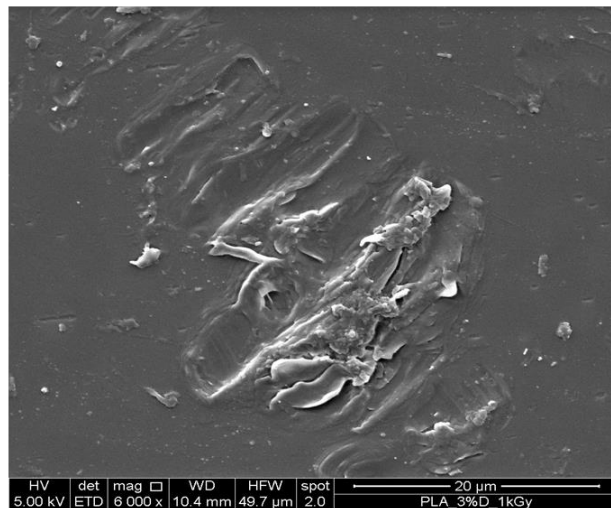


Crosslinking of Bioplastics

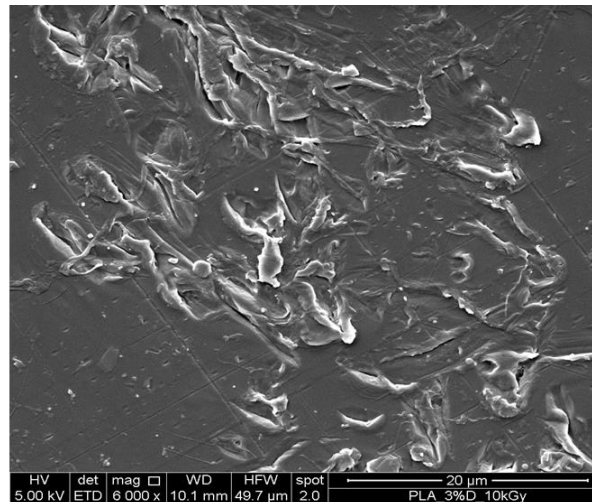
- Rigidity in the long chain macromolecules
- Thermal stability of polymers
- Heat stability above its glass transition temperature
- Withstand against stretching (of concern in odd-shaped packages)

JOURNAL OF
Applied Polymer
SCIENCE

Effect of electron beam irradiation on the properties of polylactic acid/montmorillonite nanocomposites for food packaging applications



SEM micrograph of PLA/MMT - 3% 1kGy

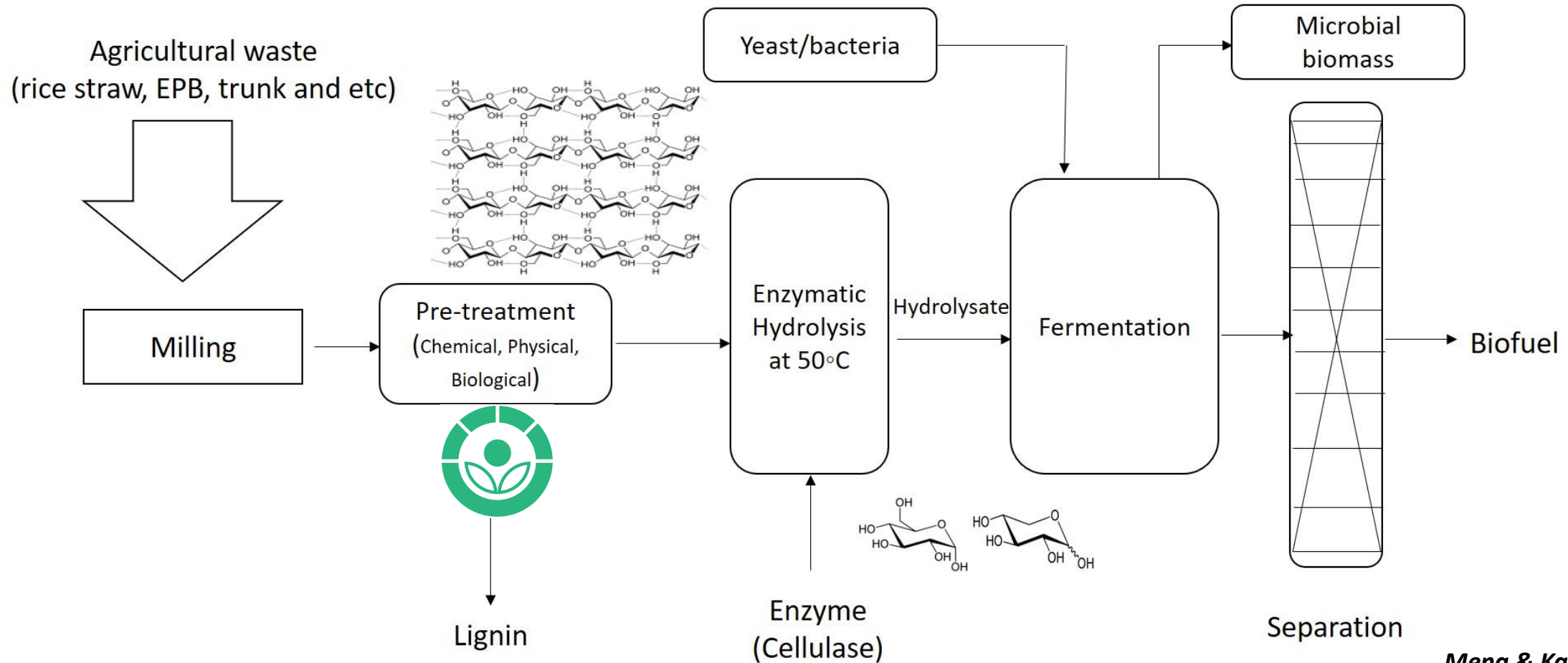


SEM micrograph of PLA/MMT 3-% 10 kGy



Shayanfar et al., 2014

Biofuel Production From Agricultural Waste



Meng & Kassim, 2022