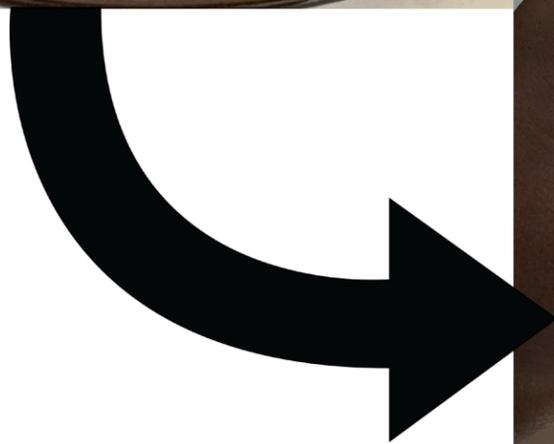


Food Fibers

Turning meals into materials



Recipes by Aya Kusumoto

“Waste is just material without an identity” - Thomas Rau

In this second installment of Food Fibers, you will learn how to make bioplastics and sturdy biocomposites. These materials can be used for a wide variety of creative projects such as window decor or makeshift coasters. These recipes are inspired by the connection of historical agricultural uses and the pioneers of science today. They have been simplified so they can easily be made at home, while getting a simple meal or snack out of it.



Caramelized Onion Omelet

Total Making Time: : ~30 minutes

Serves: 1

Ingredients:

- ½ medium yellow onion (sliced)
- 3 eggs
- 2-3 small mushrooms of choice (diced)
- 2 tablespoons of butter
- 1 tablespoon of olive oil
- 2 tablespoons of milk
- 1 teaspoon of salt

Instructions:

- Step 1 - Peel your onions but keep the skins for biofiber making. Cut the onion into thin slices from root to tip.



- Step 2 - Put 1 tablespoon of butter and 1 tablespoon of olive oil into a large pan and set on the stove over medium heat. Once butter is melted, add the onions and cook while stirring constantly until translucent for 1-2 minutes. Then add the salt.



• Step 3 - Reduce heat to medium-low and cook for 16-18 minutes stirring occasionally. They should be a blonde color by the end. If the onions take on color too quickly, then reduce the heat and add 1-2 tablespoons of water. Remove onions from the pan and let cool in a separate bowl.



• Step 4 - Add another tablespoon of oil to the pan if necessary and add your diced mushrooms to the pan. Cook for 3-4 minutes over medium heat until just starting to brown. Move mushrooms to the bowl with the onions.



• Step 5 - Mix your eggs and milk in a small bowl. Save the eggshells for biocomposite making later. Add half of your mushrooms and onions and mix.



• Step 6 - Put the 1 tablespoon of butter in the pan over medium-low heat and pour the entire egg mixture in the pan. As soon as you see the eggs start to set, stir the whole mixture for 20-30 seconds to scramble them slightly. Swirl the pan around to let eggs coat the entire bottom of the pan.



• Step 7 - After cooking about 2 more minutes, put the remaining mushrooms and onions on one half of the pan and gently flip the omelet over itself with a spatula. Slide the omelet onto a plate and serve.





Dyed Eggshell Blocks

Total Making Time: : ~1 hour

This recipe is safe to use with regular kitchen utensils.

Makes 1 3-inch round block

Ingredients:

- 3 eggshells (the more you can use the better)
- 2 tablespoons of corn syrup
- 1 tablespoon of corn starch
- 1 tablespoon of water

Instructions:

• Step 1 - Wash your eggshells in cold water then put them in a saucepan. Pour in enough water so that it covers the eggshells completely. Boil over medium heat for 10 minutes to sterilize them. As the eggshells boil, you will see white foam collecting at the top. Scrape it off the surface with a spoon as it boils.



• Step 2 - After 10 minutes, drain the eggshells completely and spread out evenly on a plate. Microwave for 3-4 minutes. Check on them every minute or so to avoid overheating.



• Step 3 - Preheat your oven to 350 degrees Fahrenheit. Crush the eggshells into a fine powder in a blender or food processor. Alternatively, you can do this by hand with a mortar and pestle, or by crushing them in a small bowl with any tool that has a flat end (i.e. a meat mallet or flat end of a spatula).



• Step 4 - Mix the eggshell powder, water, corn syrup, and corn starch in a small bowl until fully combined.



• Step 5 - Once the mixture is fully incorporated, pour the liquid material into a parchment paper-lined muffin tray. If you do not have a muffin tray, you can use aluminum foil to shape a small mold to pour your mixture into.



• Step 6 - Bake for 13-15 minutes until the mixture stops bubbling completely and is just turning brown around the edges. Remove from the oven and let cool completely to harden.



Please Note: Biofibers are NOT meant to be consumed or kept for long periods of time. Biofibers can be composted.
*For easy DIY mold ideas, please refer to the last two pages of this document.





Potato Pancakes

Total Making Time: : ~20 minutes

Serves: 2

Ingredients:

- 2 medium russet potatoes (grated)
- $\frac{1}{2}$ onion (grated)
- $\frac{1}{4}$ cup of breadcrumbs
- 1-2 eggs
- $\frac{1}{2}$ teaspoon of salt
- 1 teaspoon of baking powder
- $\frac{1}{2}$ tablespoon of lemon juice (about 1/2 lemon)
- $\frac{1}{4}$ cup of Parmesan cheese
- $\frac{1}{4}$ cup of vegetable oil

Instructions:

• Step 1 - Wash and peel your potatoes. Save the potato peels for bioplastic making later. Take a grater and grate the potatoes into a small bowl. Grate the onion into a separate bowl.



• Step 2 - Take a cheese cloth and place the grated potato inside. Squeeze as much liquid as you can from the potatoes into a small bowl. You can also use a fine mesh sieve, although you may need to squeeze out any remaining moisture with your hands. Set aside the bowl of collected liquid for bioplastic making later.



• Step 3 - Put your grated and drained potatoes and onions in a medium- sized bowl with 1 egg, breadcrumbs, baking powder, lemon juice, salt, and Parmesan cheese. Mix with your washed hands until you can form a small ball in your hand that holds together. If it is not holding together and is too dry, then add the remaining egg.



• Step 4 - Put the vegetable oil in a pan over medium-high heat on the stove. Once the oil is shimmering but not smoking, scoop a small handful of the mixture into a ball and put it in the pan. Put 3-4 balls in your pan then flatten them with the back of a spatula. Once the pancakes are fully cooked through, remove them from the pan and set on a wire rack with paper towels underneath to drain the oil. Repeat this process until all of your pancakes are cooked. Let them cool slightly and serve.





Potato Starch Bioplastic

Total Making Time: : 2-3 days depending on room temperature

This recipe is safe to use with regular kitchen utensils.

Makes 2 6-inch round bioplastic sheets

Ingredients:

- ~4 tablespoons of potato starch
- Reserved potato peels
- 1 cup + $\frac{1}{4}$ cup of water (separated)
- 4 teaspoons of corn starch
- 4 teaspoons of vinegar

Instructions:

• Step 1 - Blend the potato peels in a blender with $\frac{1}{4}$ cup of water. Use a fine mesh sieve or cheesecloth to strain the liquid out into the same bowl of potato starch liquid. You may need to squeeze out remaining moisture with your hands. Let the liquid sit for at least 15 minutes to allow the potato starch to settle at the bottom.



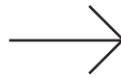
• Step 2 - Carefully pour out the water until you are left with the white/pink sediment at the bottom. If you scrape the bottom with a spatula it should be thick, similar to the texture of cold butter.



• Step 3 - If you have more or less than 4 tablespoons of potato starch then adjust the other ingredient ratios as needed. Put the potato starch and water into a medium saucepan and mix until no lumps are left. Then add the corn syrup and vinegar to the saucepan and mix well.



• Step 4 - Cook the mixture over a stove on low heat for about five minutes until it thickens and becomes translucent, stirring constantly. Watch it carefully as it will thicken in an instant.



• Step 5 - Cover the entire surface of your mold with oil. Transfer the mixture to your mold and spread it out as evenly as you can. Let it dry for 2-3 days or until smooth and no longer sticky to the touch. Then carefully remove the material from the mold.



Please Note: Biofibers are NOT meant to be consumed or kept for long periods of time. Biofibers can be composted.

*For easy DIY mold ideas, please refer to the last two pages of this document.



Ideas for DIY Molds

Don't have silicon molds at home? You can try some of these ideas below instead. Remember, the biofibers can be made into any flat shape you can think of. Please note if you use a different sized mold from the original material's dimensions then you may need to adjust your ingredients as necessary. Thickness of the material will affect drying time.

- **Use cookie cutters and a baking tray.** Take a baking tray and line the surface with parchment paper. Lay cookie cutters on the surface and hold them in place as you pour your liquid material inside. If your cookie cutters are lightweight then you can put plastic wrap on the bottom and stretch it taut until there are no wrinkles. Put a rubber band around the plastic wrap and cookie cutter to secure it. Then put the plastic wrap side down on the baking tray to ensure that the liquid material doesn't flow out while pouring.

- **Use a tart pan or springform cake pan.** Cut out a circular piece of parchment paper to line the bottom of the pan, then pour the liquid material inside. Once dry you can carefully remove the sides of the pan as you would with a pastry or cake.

- **Use a shallow pie dish.** Cut out rectangles of parchment paper long enough that it comes out of the pie dish when pushed inside. These ends will be used as "handles" to pull out the material once fully dry. Arrange 2 or 3 pieces of rectangles in the pan until most of the sides are covered. Be sure to press down on the parchment paper once the liquid material is poured inside to ensure it doesn't get in between the layers of parchment.

- **Use a plate.** Cut out a circular piece of parchment paper to line the plate and pour in the mold. Plates with a flat center are recommended as it will allow for an even surface. However you can try using shallow plates, just note that the material will become thicker in the middle as the liquid settles and dries.

- **Use a cardboard box.** You can take any sized cardboard box and cut off one flat side. Outline the center square or rectangle of your mold and draw the sides of the mold as rectangles along the sides. Be sure to cut out squares from each corner so the sides can come together neatly. Then carefully bend the sides of the cardboard until you have a shallow rectangular mold. Tape or hot glue the sides and corners to secure them. Line the bottom and sides with plastic wrap then pour your liquid material inside.

DIY Mold Step-by-Step Examples

Cookie cutters and a baking tray



Springform cake pan

