

**NuPlon™ Resin**

Technical Application: Electrical Wiring

Background

Nuplon is an environmentally-friendly, biodegradable, thermoset plastic which can be used in a wide variety of applications. The liquid precursor can be cured by heating 130 – 170 °C to form ester crosslinks which convert the liquid into a hard plastic that can be used for a variety of commodity and disposable applications. Over the course of 2-3 months of water exposure these links break down eliminating the environmental impact of Nuplon.

Goal

Due to its heat resistance and electro-insulative properties, Nuplon has the potential to find use in temporary electronics as a support/insulator board.

Resistance Test

A sheet of Nuplon type M317 (1 mm thick) was placed between the probes of a Gardner Bender (Model GDT-311) multimeter set to measure resistance. The multimeter was cycled through the various settings however no detectable flow was obtained through the full-scale of the meter indicating material electrical resistance of greater than 20 MOhm/mm (max range of multimeter).

Method

A series of shallow aluminum dishes were loaded with ~ 4-8 grams of liquid Nuplon Resin (type M317) and uninsulated 20 gauge copper wire was suspended into the resin. The resin was cured at 130 °C overnight and then held at 130 °C for another 3 days to ensure no negative effects. The aluminum dish was peeled off the Nuplon piece. The wires were then connected to 2 x AAA button-batteries on one end and a green-LED light on the other to test for use as circuit.

Results

Figure 1 shows the resultant image series for the generation of the electrical circuit using Nuplon as an example. The circuit was successful.

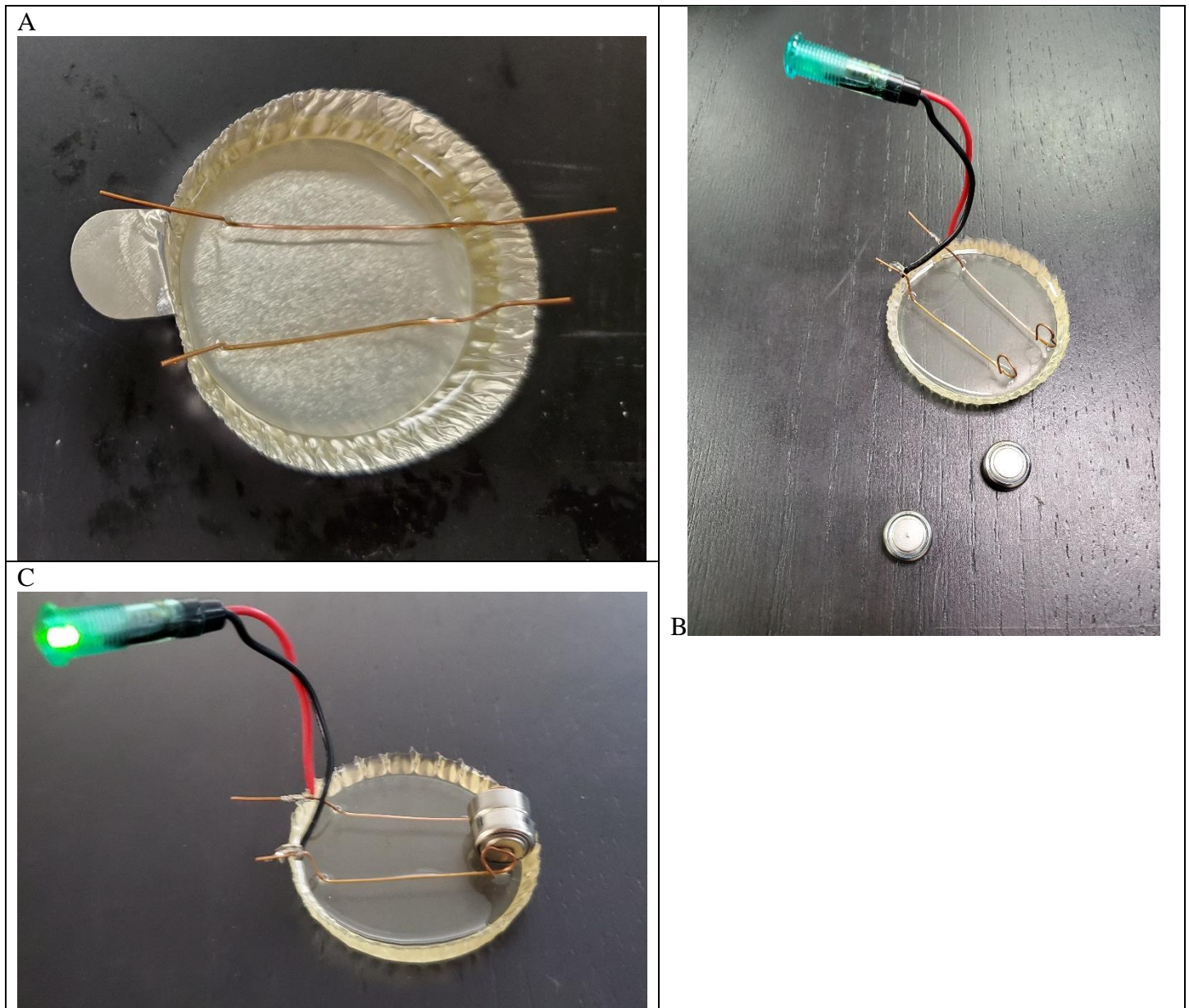


Figure 1. Image Series from making a wiring-circuit using Nuplong (A) curing copper wires inside the plastic (B) Attaching the LED (C) Final degradable wire-circuit constructed using Nuplon

Conclusion

The Nuplon product can be used for generating electrical circuits or as an insulative layer for electrical applications. The ability of electrical components to be directly cured into the resin itself as well as the degradable nature of the plastic makes it well suited for applications towards disposable electrical/electronic materials. Additionally, Nuplon's heat resistance allows for direct soldering on top of the plastic without need for a protective layer.

Customizability

Incorporation of varying additives can be used to modify the NuPlon™ materials properties to provide for a wide array of properties. Contact John Garner (jg@akinainc.com) to discuss customization opportunities to meet your needs.

Licensing Considerations

The NuPlon™ platform technology is PATENT PENDING with a priority date of filing established from provisional filing on June 25, 2020. The user's guide presented here contains information from laboratory testing at Akina, Inc. In no way does it represent all the potential uses and considerations for the NuPlon™ material. Contact John Garner (jg@akinainc.com) for joint development and licensing opportunities.