

Materials List for:

Fabrication of Carbon-Based Ionic Electromechanically Active Soft Actuators

Pille Rinne¹, Inga Põdsalu¹, Herman Klas Ratas¹, Karl Kruusamäe¹, Urmas Johanson¹, Tarmo Tamm¹, Kaija Põhako-Esko¹, Andres Punning¹, Anna-Liisa Peikolainen¹, Friedrich Kaasik¹, Indrek Must¹, Daan van den Ende², Alvo Aabloo¹

¹Intelligent Materials and Systems Lab, Institute of Technology, University of Tartu

²Smart Interfaces & Modules Department, Philips Research

Correspondence to: Pille Rinne at pille.rinne@ut.ee

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Materials

Name	Company	Catalog Number	Comments
~150 µm thick gold plates for custom contacts	local jeweler		99.9% purity (24K)
1-ethyl-3-methylimidazolium trifluoromethanesulfonate ([EMIM][OTf])	Solvionic		99.5%
100 ml Erlenmeyer flask			
4-methyl-2-pentanone (MP)	Sigma Aldrich		≥99%
acetone			technical grade
analytical balance	Mettler Toledo AB204-S/PH		
carbon powder	Y Carbon		boron carbide derived carbon, particle size <10 µm, specific surface area 1800 m ² /g, pore volume 0.5 cm ³ /g
carbon powder	Skeleton Technologies		titanium carbide derived carbon
circular disk magnets (neodymium) for custom contacts	local hardware store		d = 2 mm, thickness 1 mm
compressed air supply for the airbrush			
crocodile clips with jaws insulated from each other (Kelvin clips)	local hardware store		Optional for making custom contacts. Regular crocodile clips are not suitable because there the jaws are connected to each other at the spring.
disposable foam cup			
epoxy glue	local hardware store		preferably fast cure epoxy for attaching gold contacts to magnets
filter paper for drying	Munktell, Filtrak		e.g. diameter 150 mm and up if 142 mm PTFE sheet is used.
flat nose tweezers			
glass funnel			
gold leaf on transfer sheets	Giusto Manetti Battiloro		24K
graduated glass cylinder			
hairdryer or a heat gun	e.g. Philips		
infrared light bulb	e.g. Philips		
liquid nitrogen			CAUTION: Never close the lid of a liquid nitrogen container tightly. The pressure build-up could cause serious injuries.
magnetic stirrer / hotplate			

magnetic stirrer bars			about 1 cm long
metal pipe			e.g. d = 3 cm
metal ruler			
micrometer thickness gauge	Mitotuyo		range 0-25 mm, precision 0.001 mm
N,N-dimethylacetamide (DMAc)	Sigma Aldrich		99.5%
paintbrush			
plastic embroidery hoops	e.g. Pony		select the diameter depending on the desired batch size (e.g. 7.5 cm to 25 cm)
plastic Pasteur pipettes			
polyethylene-based laboratory stretch film	DuraSeal		
polyvinylidene difluoride-co-hexafluoropropylene (PVDF-HFP)	Sigma Aldrich		Mn = 130000, Mw = 400000
polyvinylidene fluoride (PVDF)	Sigma Aldrich		Mw (g/mol) = 534000
potentiostat/galvanostat/FRA	PARSTAT 2273		needed for electrochemical characterization
propylene carbonate (PC)	Merck		99%
PTFE filtration membrane	Omnipore	JVWP14225	0.1 µm pore size, hydrophilic , 142 mm diameter, 30 µm thickness, 80% porosity
PTFE filtration membrane	Omnipore	JGWP14225	0.2 µm pore size, hydrophilic , 142 mm diameter, 65 µm thickness, 80% porosity
scalpel			
scotch tape			
silk (woven textile)	Esaki Model Manufacturing	#3	11.5 g/m ²
soldering equipment	local hardware store		For connecting the ~150 µm gold plates to the clips
spray gun, airbrush	Iwata HP TR-2		
sputter coater	Leica EM ACE600		
tabletop scanning electron microscope	Hitachi TM3000		
ultrasonic processor	Hielscher UP200S		