

Materials List for:

Creating a Structurally Realistic Finite Element Geometric Model of a Cardiomyocyte to Study the Role of Cellular Architecture in Cardiomyocyte Systems Biology

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Materials

Name	Company	Catalog Number	Comments
Materials			
Sodium chloride	Sigma-Aldrich	746398	
Calcium chloride	Sigma-Aldrich	C8106	
Magnesium chloride	Sigma-Aldrich	M2393	
Sodium bicarbonate	Sigma-Aldrich	S5761	
Potassium chloride	Sigma-Aldrich	P5405	
Dextrose	Sigma-Aldrich	D9434	
Sodium hydroxide	Sigma-Aldrich	S8045	
Probenecid	Sigma-Aldrich	P8761	
2,3-Butanedione monoxime	Sigma-Aldrich	B0753	
25% Glutaraldehyde EM Grade (500 ml bottle)	Merck	354400-500ML	
Paraformaldehyde	Sigma-Aldrich	P6148	
Tannic Acid	Sigma-Aldrich	403040-500G	100g EM grade
Sodium cacodylate	Sigma-Aldrich	C0250	
Phosphate-buffered saline (PBS)	Sigma-Aldrich	P4593	
Osmium Tetroxide	Sigma-Aldrich	75632-10ML	4% in water, 5 ml bottle (or 10 ml bottle also available)
Uranyl Acetate	EM Sciences	22400	25g bottle
Potassium Ferrocyanide	Merck Millipore	104973	
Toluene blue	Sigma-Aldrich	T3260	
Borax	Sigma-Aldrich	S9640	also termed sodium borate
Ethanol	Sigma-Aldrich	792780	Diluted to different percentages with pure water
Acetone	EM Sciences	RT10017	
Resin kit	EM Sciences	14040	ACM Durcupan works well

Hydrochloric acid	Sigma-Aldrich	H9892	1Normal solution
Equipment			
Ultramicrotome	Leica	EM UC7	
Transmission electron microscope	ThermoFisher Scientific	Tecnai F30	http://www.leica-microsystems.com/
Retort stand	Proscitech	T752	
Tubing	BioStrategy	75831-346	for langendorff perfusion apparatus, 3 mm diameter is recommended but not essential
Stopcocks	SDR	QP13813	for langendorff tubing; product is only an example, user can select any
retort stand clamps	Proscitech	T715	
Plastic syringes	SDR	QPC1108	for solutions on langendorff apparatus
Cannulation silk suture, 7-0	TeleFlex	15B051000	for tying heart on langedorff apparatus
Cannula			Made from 3 mm outer-diameter steel needle
Rubber petri dish mat	Proscitech	H068	for use as cutting board during fixed-heart dissection
Razor blades	Proscitech	L056	for cutting fixed-heart into small blocks for EM processing
Glass bottles	BioStrategy	89000-236	for storing solutions during tissue fixation and processing for EM
Beakers	BioStrategy	213-0477	for storing solutions temporarily and during perfusion
Scintillation vials	BioStrategy	548-2170	for tissue samples during EM processing
Dissection kit	Proscitech	T161	for animal dissection
Syringe Filters	Proscitech	WS3-02225S	for purification of Uranyl Acetate
Aluminium/silver foil baking cups			From any baking products store
Dupont Diamond knife	BioStrategy	102680-780	35 degree angle version produces best sections.
Colloidal Gold	BBi Solutions	EM. GC15	15 nm colloidal gold
EM mesh grids	Proscitech	GCU150	a variety of sizes can be tested: GCU150h, GCU200h for example
Plastic disposal pipettes	Proscitech	LCH20	best to use plastic disposables especially when working with resin
Software			
SerialEM	University of Boulder		tomography acquisition
MATLAB	MathWorks		https://www.mathworks.com/products/matlab.html
IMOD	University of Boulder		image alignment and segmentation
iso2mesh			available at http://iso2mesh.sourceforge.net
Fiji or similar image processing software	ImageJ	Fiji is Just Image J	available at https://fiji.sc for manipulation of binary image stacks
RyR-Simulator codes/data	CellSMB group		available at https://github.com/CellSMB/RyR-simulator
CardiacCellMeshGenerator	CellSMB group		comes with RyR-Simulator under folder "gui-version"

R-statistics software	R-project		Download from https://www.r-project.org
spatstat	R-project		install via R program
rgl	R-project		install via R program
doparallel	R-project		install via R program
foreach	R-project		install via R program
doSNOW	R-project		install via R program
iterators	R-project		install via R program