Directions for Use

Product: ELMA®+

SKU: 52RA

Intended application	Component for bioinks and tissue engineering applications.
Solubility	Soluble in aqueous buffers up to 20% (w/v). Solubility is highly dependent on the buffer's composition. Higher concentrations may be achievable. A 30% solution in distilled water is turbid. For optimal results, maintain total salinity ≤ 150 mM.
Recommended buffers	PBS, 50 mM Tris (pH 7-8)
Viscosity	ELMA®+ does not gel and forms a low-viscous solution in aqueous media, matching the medium's viscosity. For bioprinting, add ELMA®+ to a base bioink formulation containing a gelling component. ELMA®+ tends to reduce the viscosity of the base bioink, depending on the total ratio of ELMA®+.
Sterile filtration	Sterile filtration of ELMA®+ solutions in deionized water has been evaluated using syringe filters equipped with a 0.2 µm PES membrane. Sterile filtration is readily feasible at concentrations of up to 5%. At concentrations above 5% and up to 10%, the filtration flow rate decreases, which may make the process less practical.
Recommended mass ratios and photoinitiators in bioinks	Add ELMA®+ to other bioink components in a dry mass ratio of 1:4 or lower for use with LAP. Higher ELMA®+ contents may require alternative photoinitiators due to the intrinsic light absorption properties of elastin. $Ru(bpy)_3$ at 480 nm has been successfully tested for the photopolymerization of ELMA®+. If ELMA®+ is the main component, sodium persulfate (SPS) and longer illumination times are required for efficient polymerization. Polymerization of ELMA®+ from a 10% aqueous solution without any other polymers has been achieved by adding 2 mM or higher $Ru(bpy)_3$ and 20 mM or higher SPS with illumination at 480 nm for 5 minutes. Additional heating of the print bed can support the curing process and potentially reduce the required illumination time.
Temperature sensitivity	Elastin undergoes a liquid-liquid phase transition in solution when heated. This process, known as coacervation, can be visually identified by increased turbidity in an elastin solution. While this effect might facilitate polymerization, it could also interfere with certain assays and protocols. Besides temperature, ionic strength, pH, and elastin concentration influence the onset temperature of coacervation. Validate the compatibility of ELMA®+ with your experimental conditions. Coacervation can be prevented by adjusting the mentioned parameters to lower values. Since ELMA®+ contains terminal carboxylic functional groups, alkaline conditions may favor ELMA®+ solubility.
Preparation of acellular elastin gels by heat-induced polymerization	Prepare an ELMA®+ solution with a concentration of at least 10% in deionized water. Add sodium persulfate and heat in a drying oven at 85°C until a solid gel forms.