



Mussel Adhesive Protein based Matrix (MAPTriX)

MAPTriX constructed the novel type of hybrid mussel bioadhesive fp-151, a fusion protein comprising six fp-1 decapeptide repeats at each fp-5 terminus. It showed efficient adhesion and biocompatibility for various cell types including both anchorage dependent and anchorage-independent cells. It will readily coat a variety of materials, such as glass, plastics, metals, and leather.

Source : Recombinant expression in *E. coli*.

Formulation

Type A : 5mg, Lyophilized Powder

Type B : 5 mg/ml in 5% acetic acid

Stability and Storage

Stable for three months from date of shipment at 2°C to 8°C.

Store at -5°C to -20°C. Do not freeze and thaw repeatedly

Quality Control

Purity and Identity: >85% by SDS-PAGE (Comassie stained :15% gel)

Functional Qualification (Cell attachment and Spreading) : Hela

Test Procedure for Adhesion

Direct application of MAPTriX powder or MAPTriX solution on your test surface at your convenience, but the first is desirable for most applications except cell adhesion or special coatings. It is not easy to suck highly concentrated MAPTriX solution using micropipette and to drop the MAPTriX solution on your test surface due to its viscosity and adhesiveness to the micropipette tip.

1. Cell Adsorption coating protocol (Application of MAPTriX solution)

① Prepare a neutral buffer solution.

0.1M sodium bicarbonate, pH 8.0 is recommended . Filter-sterilize the buffer.

Add 0.1M sodium bicarbonate, pH 8.0 to culture surface. The exact volume of buffer will depend on culture surface. Recommended volume 500 μ l to 24well culture plate.

② Add appropriate amount of MAPTriX to culture surface.

Recommended concentration -3.5 μ g/cm² of growth surface depending on cell type. Shake plate, mixing thoroughly

③ Incubate at 37°C for 30-60min.

④ Remove coating solution.

⑤ Rinse plates carefully with PBS.

Avoid scratching bottom surface of plates.

⑥ Seed cells onto the coated substrate.

2. Direct application of MAPTriX powder on the sample surface (bulk-scale)

① Prepare the dissolving solution

NOTE : Solution is deionized water without or with 50 mM of Fe(NO₃)₃ or NaIO₄ (sodium periodite). The metal oxidant will facilitate the crosslinking reaction, consequently resulting in higher adhesive strength and shorter hardening time. NaIO₄ can generally confer better adhesion strength than Fe(NO₃)₃, but their optimal concentrations were not investigated yet.

② Prepare the MAPTriX solution

Note: For fast dissolution in small volume of dissolving solution, stir or tap MAPTriX powder using spatula or tip. About 300 g/L is the maximum MAPTriX solubility.

③ When the MAPTriX solution is lightly brown colored, it might be ready for adhesion.

④ Place your other surface on the MAPTriX-covered surface for adhesion.

⑤ Incubate the jointed surfaces for MAPTriX hardening.

Note 1: Currently, we are using dry condition and relative high temperature for around 24 hrs for MAPTriX hardening and/or curing because we investigate its maximum adhesion strength. We think shorter incubation time might be fine for MAPTriX hardening. Further investigation on the temperature effect and temporal course that are required for proper MAPTriX hardening and/or curing are recommended for your own tests.

Note 2: The addition of crosslinking agent such as glutaraldehyde would speed up the adhesion. Our one time test showed that the adhesion could start in 4 hrs with 1 wt% of glutaraldehyde. Put pressure on the jointed surface or fix the jointed surface with strong clamp; these will make more higher adhesion strength. The wider surface contacted with rMPA makes the higher adhesion strength if needed.

⑥ Measure the physical properties.

Reference

1. Hwang DS, et al Biomaterials. 2007 Oct;28(28) :4039-46
2. Hwang DS, et al Biomaterials. 2007 Aug ;28(24):3560-8
3. Hwang DS, et al J Biotechnol. 2007 Jan 20;127(4):727-35
4. Hwang DS, et al Biotechnol Prog. 2005 May-Jun;21(3):965-70
5. Hwang DS, et al Appl Environ Microbiol. 2004 Jun;70(6):3352-9