

Standard Coacervate Adhesion Protocol

Use these recommendations only as guidelines in determining the optimal coating conditions for your specific application

Standard Protocols

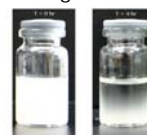
1. Preparation of MAPTrix™ Coacervate Solution

- Prepare a buffer solution comprised of 20 mM sodium acetate (aq.) at pH 5.
- Dissolve MAPTrix™ protein at a concentration of 20 mg in 1mL of prepared 20 mM sodium acetate buffer, pH 5.0.
- Dissolve hyaluronic acid (HA) powder to form a final concentration of 20 mg/mL in the buffer solution. The recommended molecular weight (MW) of HA ranges from 30,000 ~ 100,000 daltons (Da), depending upon your particular application. [Note: Kollodis commercially supplies solutions of 2wt% of hyaluronic acid (in MWs of HA: 30K, 50K, and 100K daltons) in 20 mM sodium acetate (pH 5.0)].
- Combine the MAPTrix™ solution and hyaluronic acid solution to a final 3:1 volume ratio (MAPTrix™: HA) and allow the combined solution to form a coacervate solution that settles out of solution (allow to settle for at least four hours).
- After at least four hours, you have formed a coacervate phase (refer to Figure 3). The coacervate phase has a tubular network with diameters ranging from 10-20 nm.

① Dissolving



② Mixing



③ Concentration



2. Adhesion Procedure

- Using a pipette, add the coacervate phase to your substrate.
- Apply an oxidizing solution (Fe^{3+} or periodate) to the coacervate adhesive. A recommended oxidizing solution is comprised of 1mM FeCl_3 in 10mM Bis-Tris (pH 5.5). Sodium periodate (NaIO_4) can also be used in place of FeCl_3 . The coacervate adhesive becomes load-bearing upon formation of multivalent DOPA- Fe^{3+} complexes.
- The coacervate adhesive sets within several minutes via a pH triggered solidification of the complex coacervate.

[Note: The color of the coacervate adhesive is generally brown. When DOPA- Fe^{3+} complexes form, its color becomes dark grey due to formation of a divalent metal complex. The color becomes purple when a trivalent complex forms under alkali conditions (refer to the Figure in the right)].

- The initial adhesive setting can be followed up over several hours by covalent cross-linking through DOPA (3,4-dihydroxy-L-phenylalanine) residues. Both the pH-triggered setting and dopa-mediated cross-linked setting generate relatively strong wet adhesive coacervates.

