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Spin Coating Protocol

Spin Coating PVP CoatedPlasmonic Nanoparticles

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V 1.0

General Protocol for Spin Coating Plasmonic Nanoparticles

Excipient solution preparation:

1) Weigh out 3 g of 360,000 MW polyinylpyrrolidone (PVP)
2) Dissolve PVP in 47 mL of 200 proof ethanol to produce a 6 wt % solution of PVP. Agitate solution vigorously to dissolve PVP, gently heat if necessary.
3) Once PVP is fully dissolved, solution is ready for use

Nanoparticle spin coating solution preparation:

1) Pipette 1.5 mL of nanoparticle solution into a 1.5 mL snap-top Eppendorf tube
    a. Typically, PVP-coated or silica-coated particles are used for spincoating; other surfaces will work, but silica-coated particles are the best
    b. Nanoparticles should be at BioPure concentration (~ 1 mg/mL)
2) Centrifuge sample for 5 min at 2000 rcf (for 150 nm gold nanoshells). Faster spin speeds and longer times may be necessary for smaller nanoparticles
    a. Centrifuge used is an Eppendorf microcentrifuge with a 24 well rotor
3) After centrifugation is complete, decant (clear, colorless) supernatant using a micropipette
4) Add 250 µL of the 6 % PVP excipient solution to the tube, sonicate and vortex to disperse the nanoparticles
5) Nanoparticle solution is now ready for spin coating

Spin coating protocol:

1) Affix substrate to rotor (vacuum chuck for NCX setup)
    a. Typically, 1" diameter circular acrylic disks are used as the substrate at NCX
    b. Smaller substrates may require less material for complete coverage
    c. Circular substrates can be coated more uniformly than square substrates
2) Spin rotor at a speed of 4400 rpm
3) Once rotor reaches speed, draw up 100-200 µL of nanoparticle solution into a 200 µL pipette tip
4) Rapidly eject 75-125 µL of particles onto the center of the spinning substrate. Avoid adding gradually or in increments to avoid the formation of uneven layers
5) Rotate substrate for 10-15 s after particle deposition, then rotation can be stopped
6) Process is now complete. Disk is sensitive to scratching and moisture—handle only on edges while wearing gloves
7) Au nanoparticle coatings are quite stable, but Ag samples are sensitive to atmospheric moisture and can degrade over time (days to weeks). Store Ag samples under dry conditions (Ziploc bags, plastic sheaths, dessicator) to ensure minimal degradation of Ag nanoparticles.