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A home built low temperature laser scanning tunneling microscope for nanoscale optical experiments

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To better understand the optical and photo-physical properties of single molecules/atoms at nanoscale, which is critically important for the development of molecular electronics and organic photovoltaic devices, we are developing a low temperature Laser Scanning Tunneling Microscope (LT Laser STM) with integrated high-numerical-aperture (NA) optics based on the Pan-style STM scanner. Using slip-stick inertial piezo steppers, the sample stage can be coarsely translated in X and Y directions. For optical experiments, three-axis inertial lens stages behind and above the sample can align the high-NA optics to focus laser excitation to and from photon collection at the tip-sample junction. The STM is cooled by a liquid helium bath surrounded by a liquid nitrogen jacket for operation near 5 K. Two separate ultrahigh vacuum chambers are used for sample preparation and STM measurements. The STM have been finished and the Laser section will be incorporated soon.

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PGJ nanoparticle associated to acellular human amniotic membrane scaffold: A new system for local anti-inflammatory therapy

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The pathogenesis of chronic inflammatory diseases is multifactorial and includes factors as tissue injuries, metabolic disorder and autoimmune diseases. The 15-deoxy-12,14-PG J2 is known for its anti-inflammatory, antioxidant and immunomodulatory properties. In vivo adhesions between cells and the extracellular matrix play a crucial role in cell differentiation, proliferation, and migration as well as tissue remodeling. Here, we present a simple method to incorporate 15d-PGJ2 nanoparticles in acellular human amniotic membrane scaffold, as potential local anti-inflammatory delivery system. After completely removing the cells on the amniotic membrane with a sodium dodecyl sulphate and mechanical approach, we seeded Vero cells incorporate 15d-PGJ2 nanoparticles on it. The morphology of the Vero cells and nanoparticles was observed by scanning electron microscopy (SEM). The cells cultivated observed by scanning electron microscopy (SEM) presented the incorporation of the nanoparticles smooth surface and spherical shape. Our results indicate that the HAM may be an ideal candidate as a nanoparticle-matrix adhesion substrate to study a new system for local anti-inflammatory therapy.

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