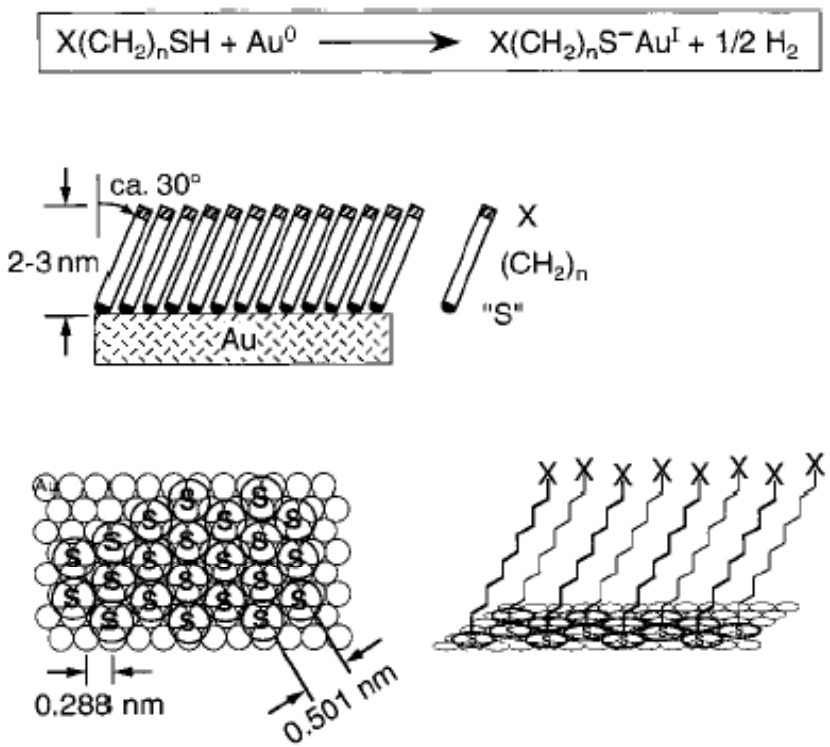


Figure 29.1. Representation of an ordered monolayer of alkane thiolate formed on a Au surface. The alkyl chains extend from the surface in a nearly all-trans configuration with an average tilt of approximately 30° from the surface normal. (From Ref. 2 by permission of Wiley-VCH.)

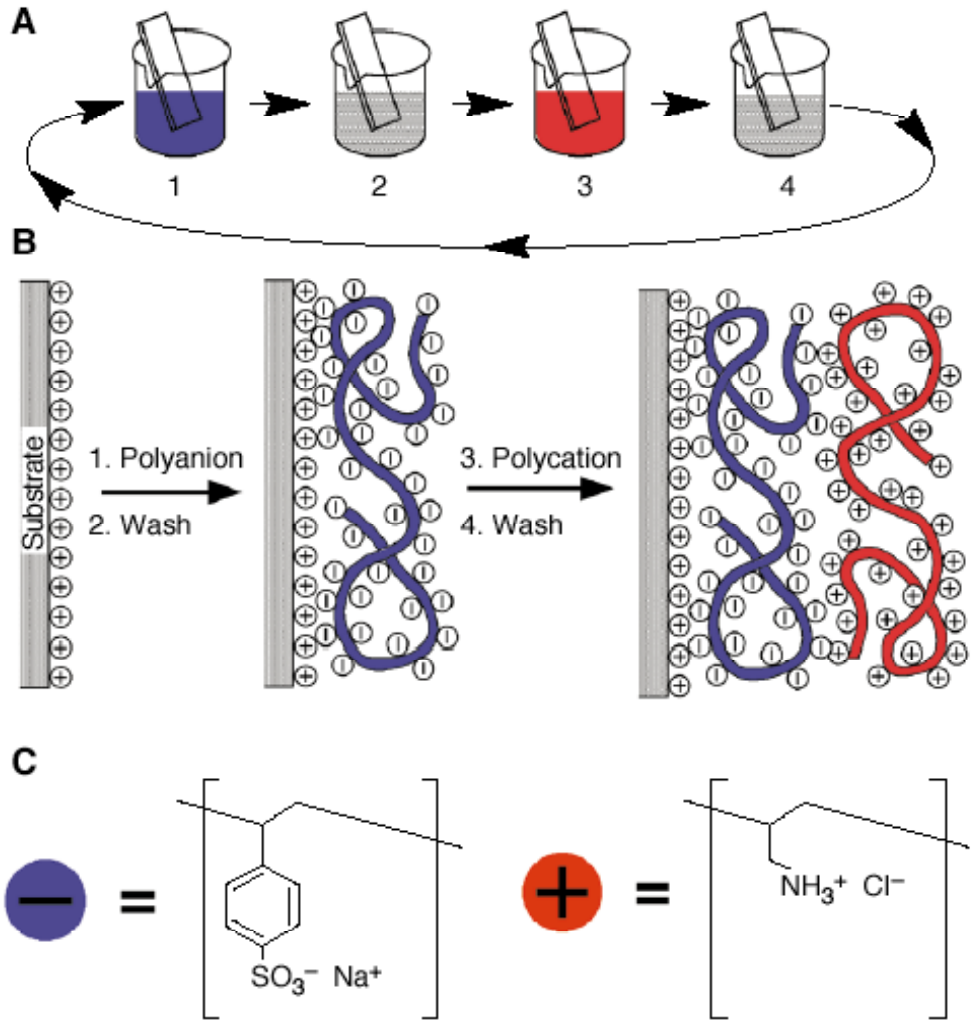


Figure 29.2. A) Schematic illustration of the electrostatic layer-by-layer film deposition process. B) Simplified depiction of the polyelectrolyte layers. C) Examples of typical polyelectrolytes use din the LbL process. (From Ref. 3 by permission of American Association for the Advancement of Science.)

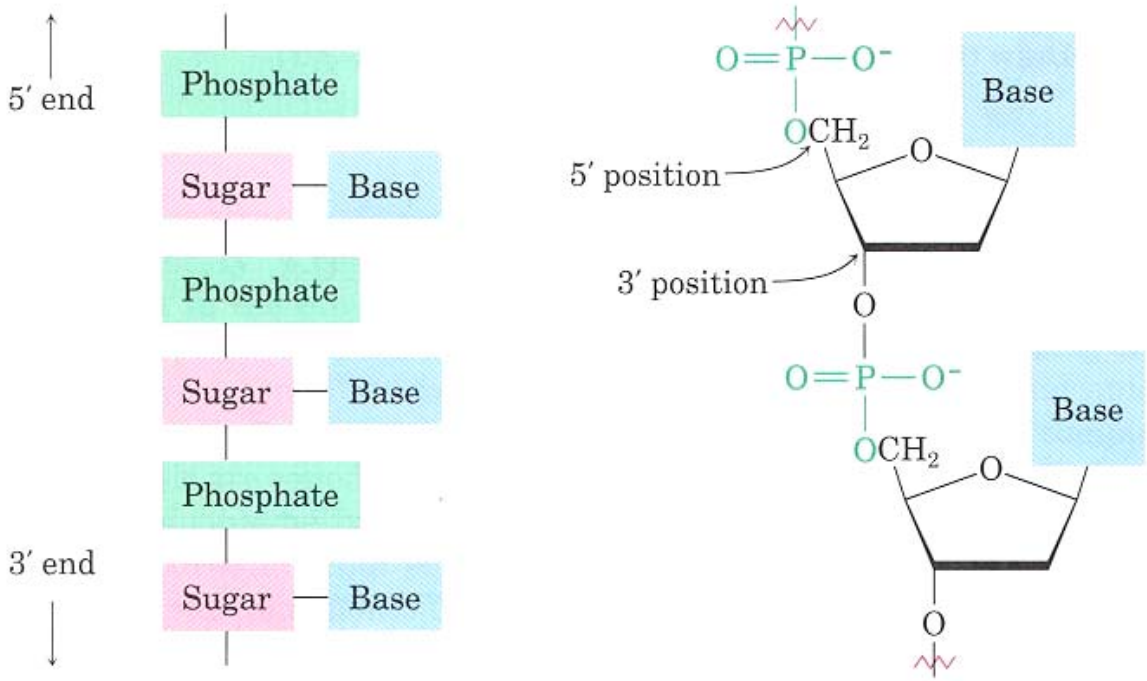


Figure 29.3. Basic structure of DNA consisting of a sugar, phosphate, and base in each repeat unit. The base can be adenine (A), guanine (G), thymine (T), or cytosine (C).A binds exclusively with T and G binds exclusively with C.

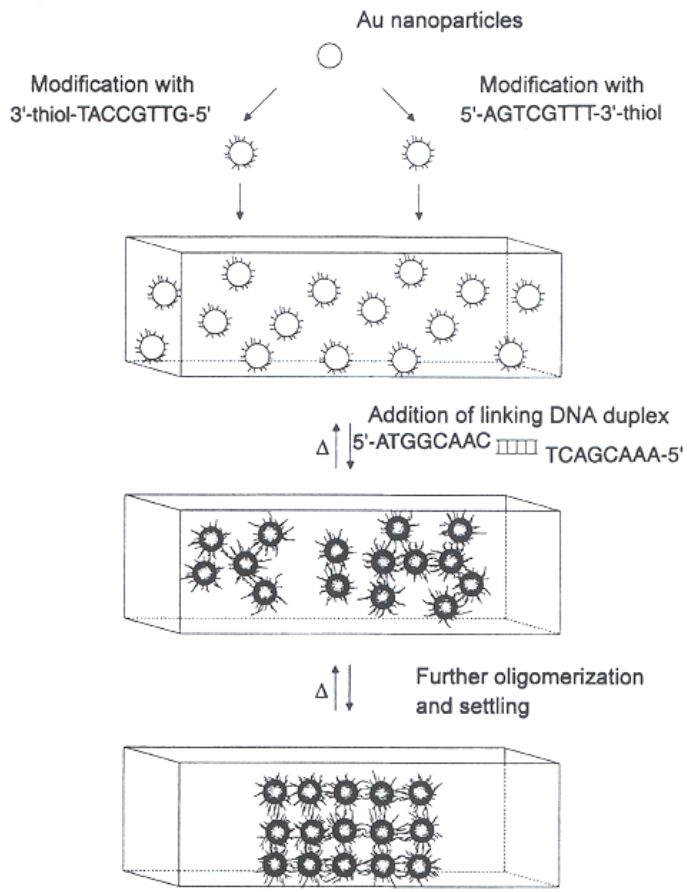


Figure 29.4. Scheme showing DNA-based colloidal assembly of gold nanoparticles. (From Ref. 4 by permission of Nature Publishing Group.)

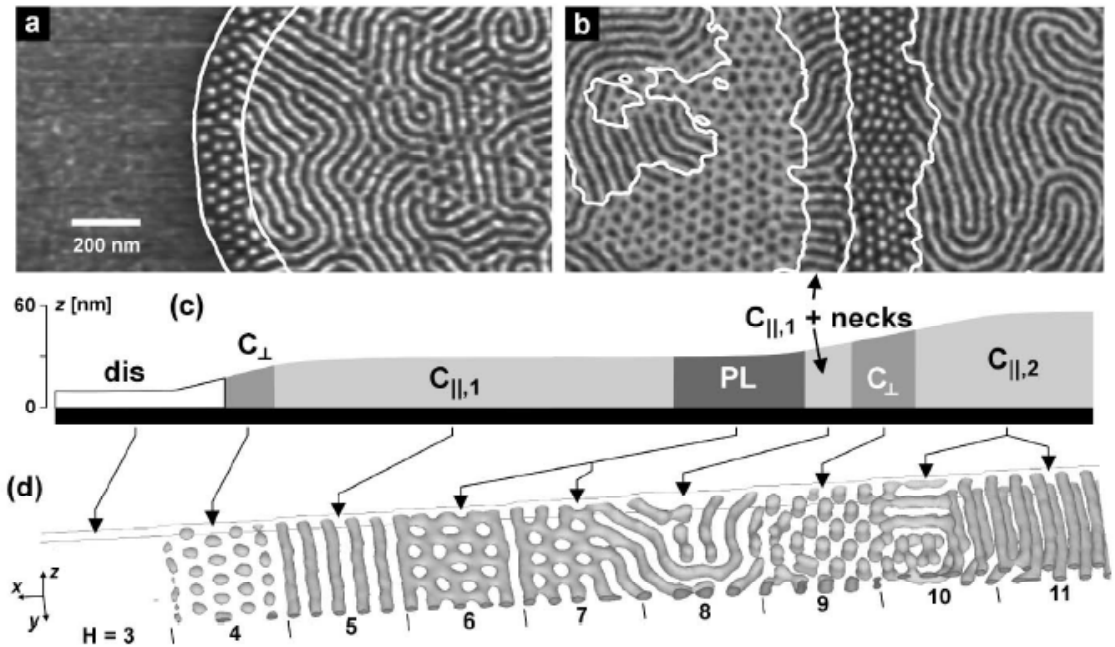


Figure 29.5. Tapping mode atomic force microscopy phase images of thin polystyrene-block-polybutadiene-block-polystyrene triblock copolymer films on Si substrates after annealing in chloroform vapor. (From Ref. 6 by permission of American Physical Society.)

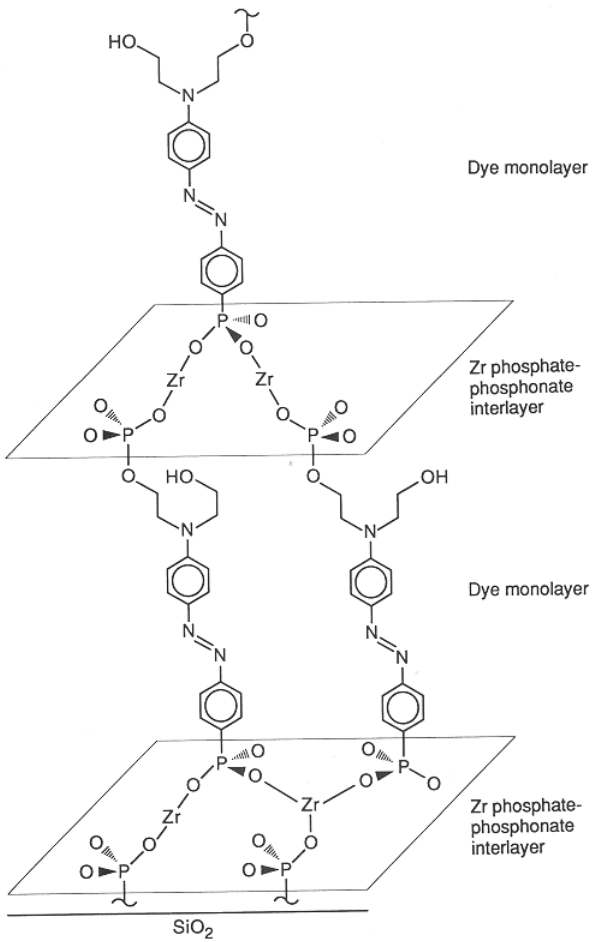


Figure 29.6. Schematic illustration of polar, self-assembled multilayers grown with Zr phosphate-phosphonate interlayers. (From Ref. 9 by permission of American Association for the Advancement of Science.)

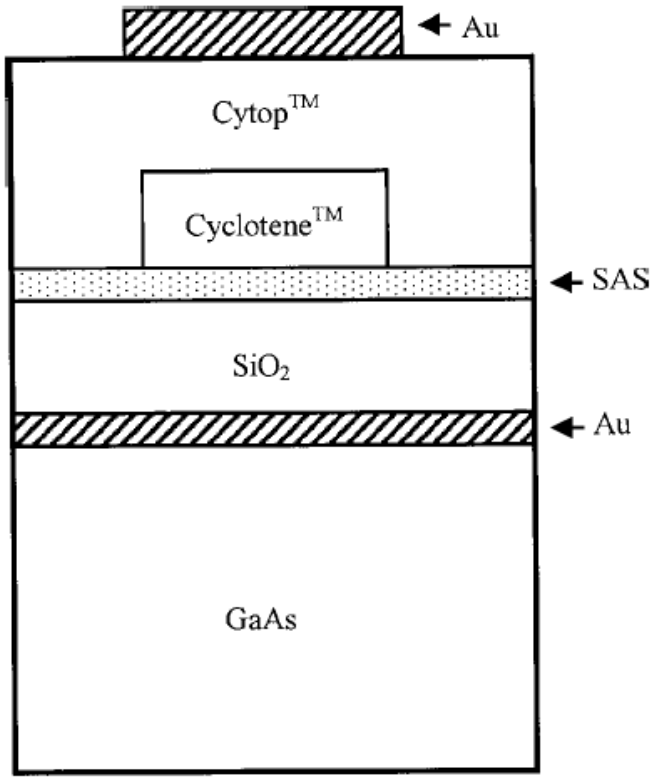


Figure 29.7. Schematic cross-section of an electro-optic modulator waveguide with an active organic self-assembled superlattice (SAS). (From Ref. 13 by permission of American Institute of Physics.)

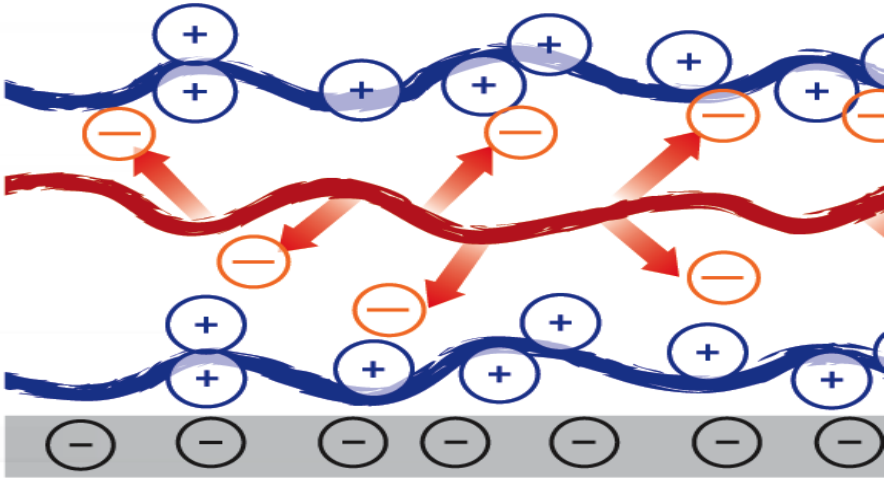


Figure 29.8. Schematic illustration of an electrostatic LbL film containing a polar nonlinear optical polymer with the arrows representing electric dipoles.

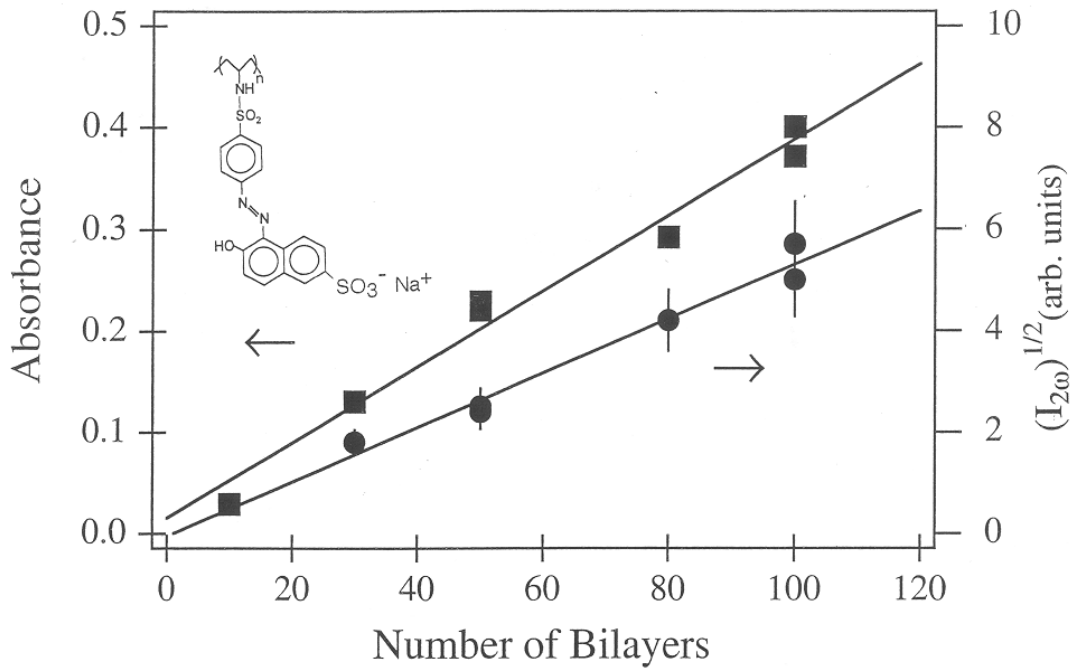


Figure 29.9. Absorbance at 500 nm and square root of the SHG intensity as a function of the number of bilayers for films made by layer-by-layer polyelectrolyte deposition. (From Ref. 19 by permission of American Institute of Physics.)

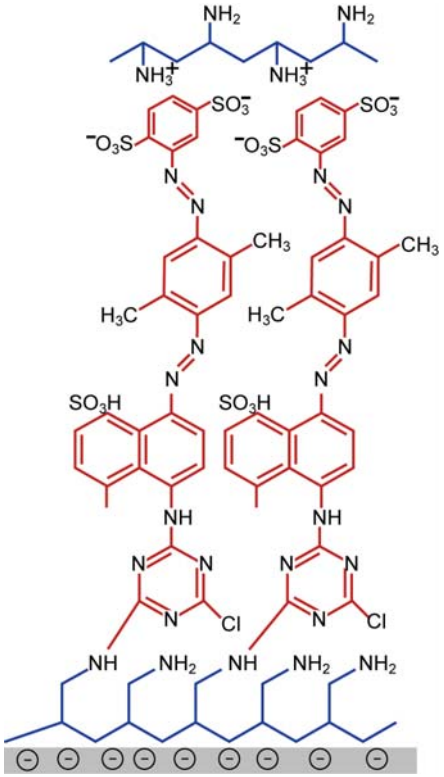


Figure 29.10. Hybrid covalent / ionic deposition of Procion Brown MX-GRN and poly(allylamine hydrochloride).

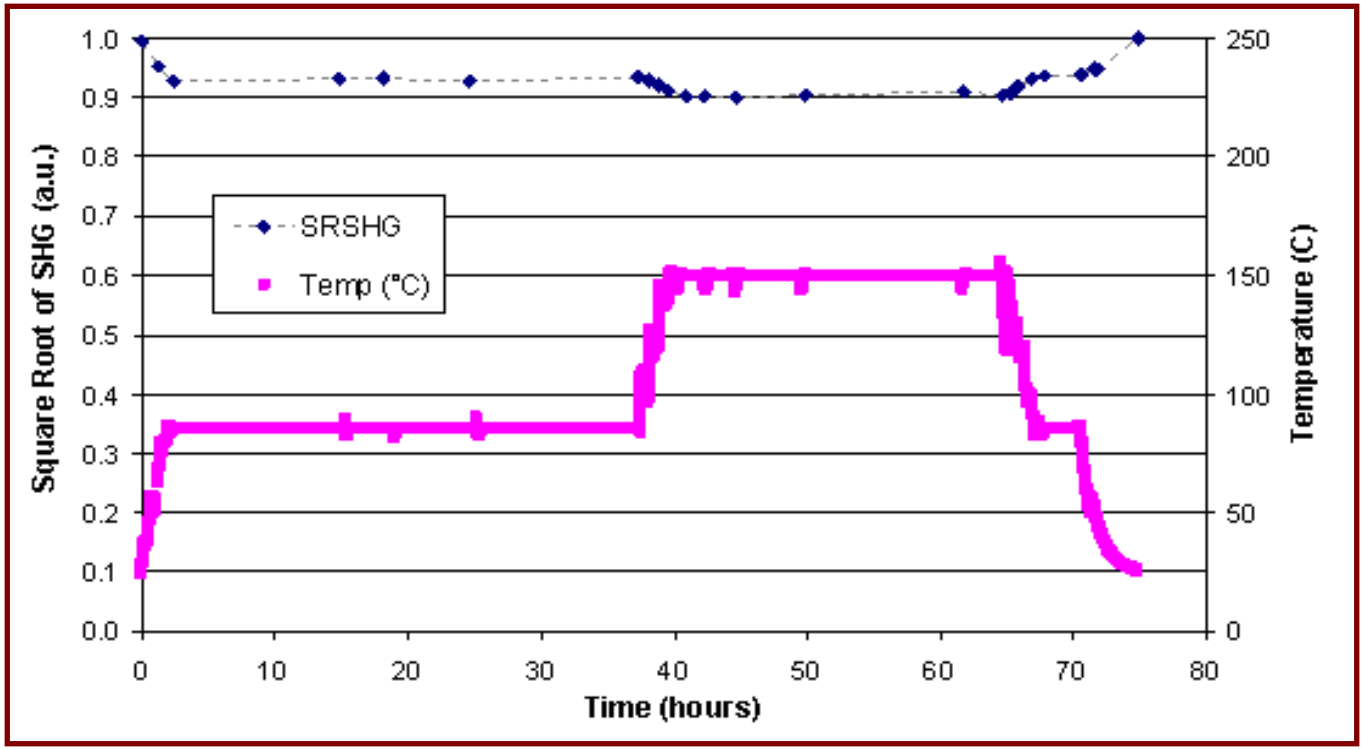
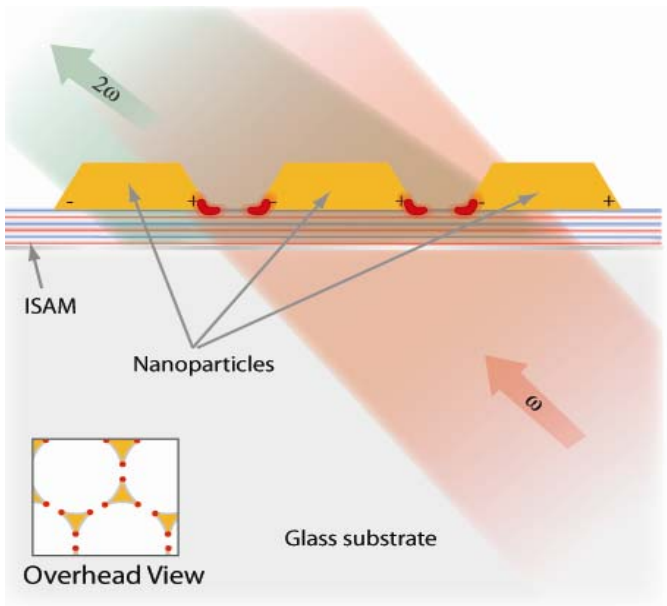
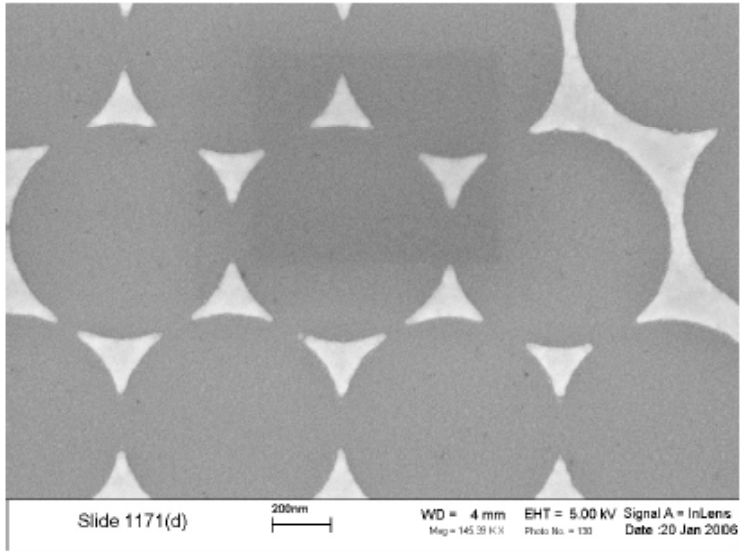


Figure 29.11. Square root of the SHG intensity (left axis, circles) of a Procion Brown/PAH hybrid covalent/ionic film as a function of time and temperature (right axis, solid curve) during a heating cycle.



a)



b)

Figure 29.12. a) Schematic sideview of second harmonic generation in a LbL (also known as ionic self-assembled multilayer, ISAM) and metallic nanoparticle film. The localized intensity enhancement (red dots) yields a corresponding increase in the second harmonic intensity. b) SEM image of an array of silver nanoparticles (bright phase) fabricated by nanosphere lithography, using 720 nm diameter polystyrene spheres (removed) as a template.

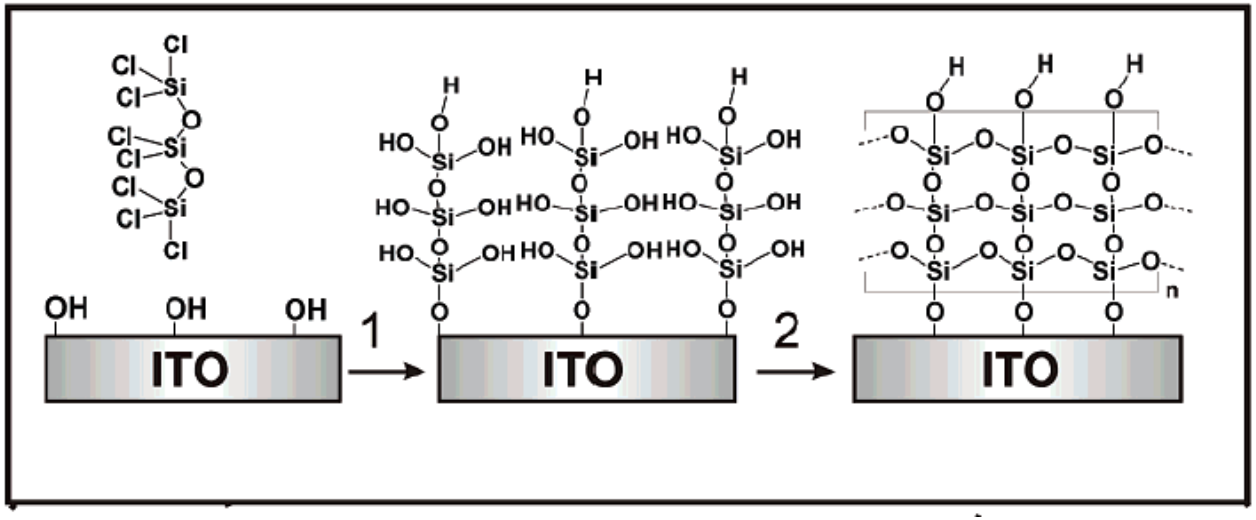


Figure 29.13. Layer-by-layer chemisorptive self-assembly of siloxane dielectric layers on an ITO anode. (From Ref. 29 by permission of American Chemical Society.)

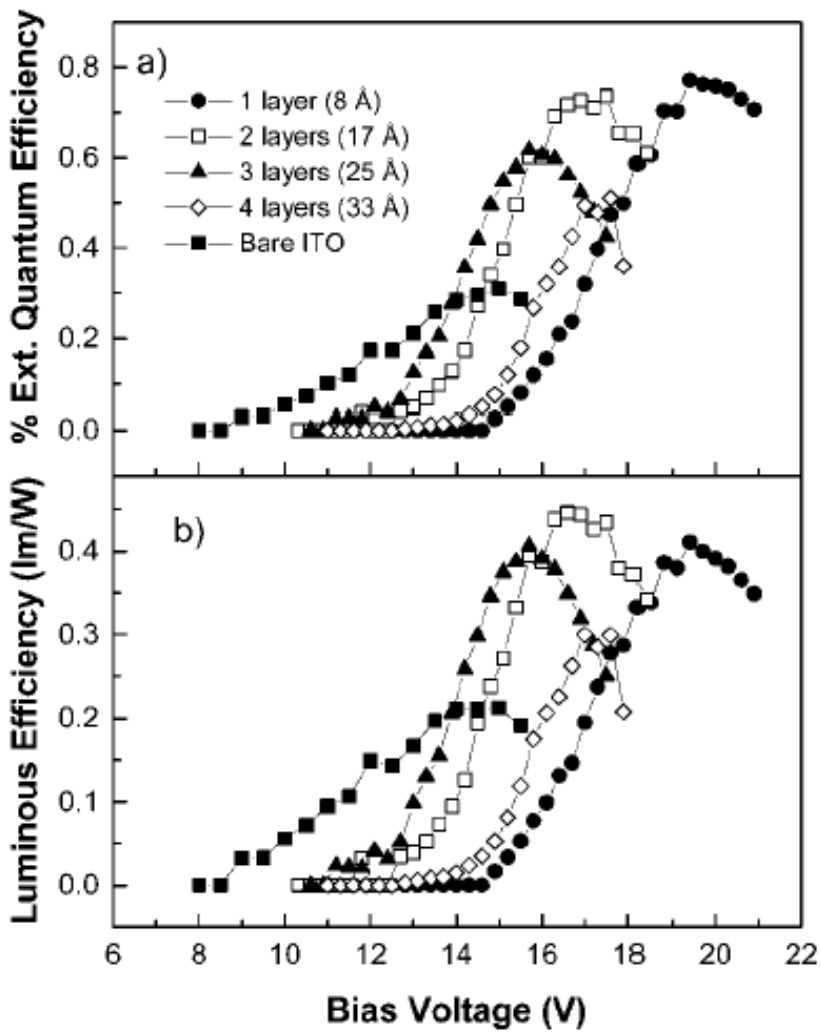


Figure 29.14. a) External quantum efficiency and b) luminous efficiency as a function of the number of self-assembled siloxane layers. (From Ref. 29 by permission of American Chemical Society.)

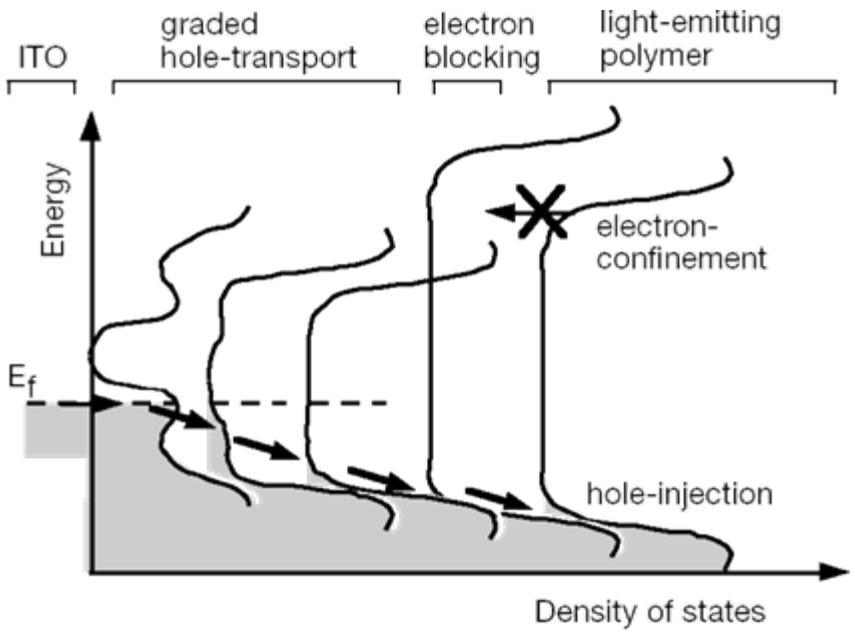


Figure 29.15. Schematic of the electronic density of states across a graded interlayer fabricated using electrostatic layer-by-layer assembly. (From Ref. 32 by permission of Nature Publishing Group.)

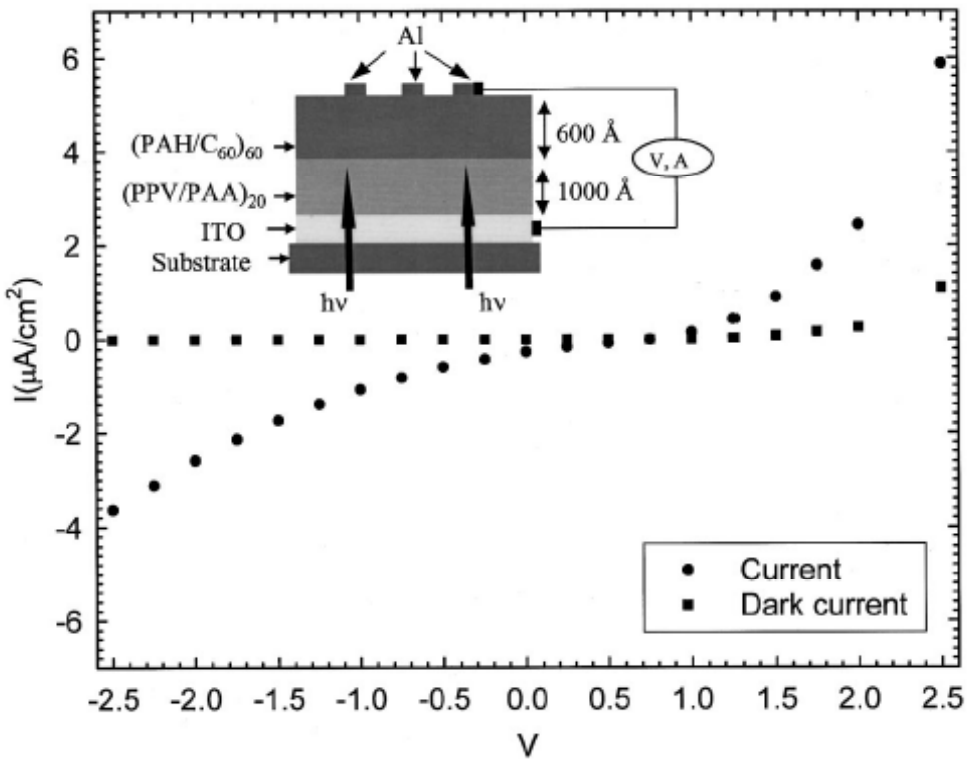


Figure 29.16. Photocurrent and dark current versus applied voltage for a photovoltaic devices fabricated by LbL deposition. (From Ref. 35 by permission of American Institute of Physics.)

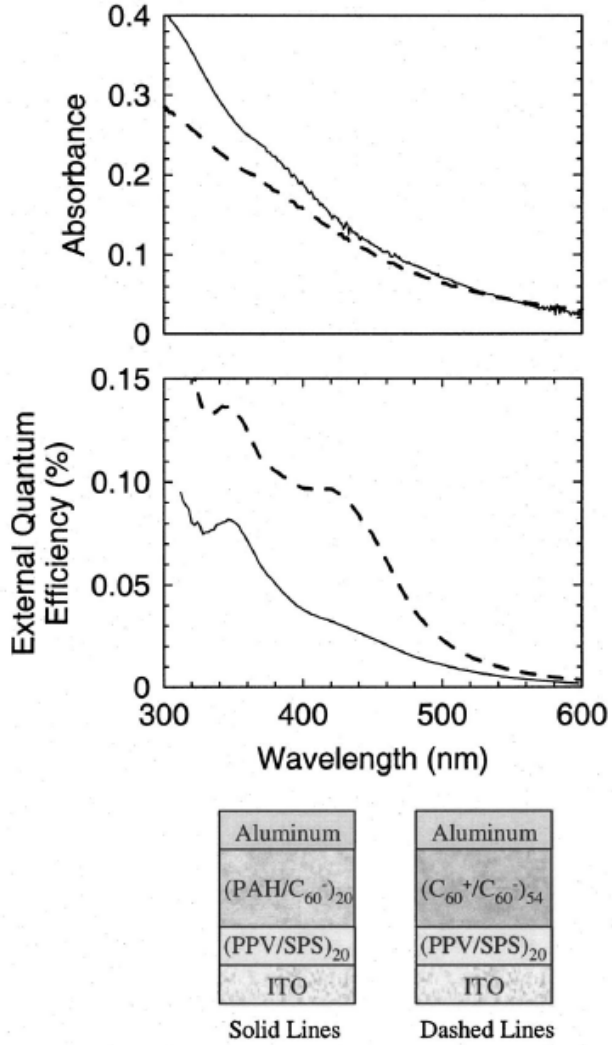


Figure 29.17. Absorbance and external quantum efficiency versus wavelength for photovoltaic devices fabricated by LbL deposition with two different electron acceptor blocks. (From Ref. 36 by permission of American Institute of Physics.)

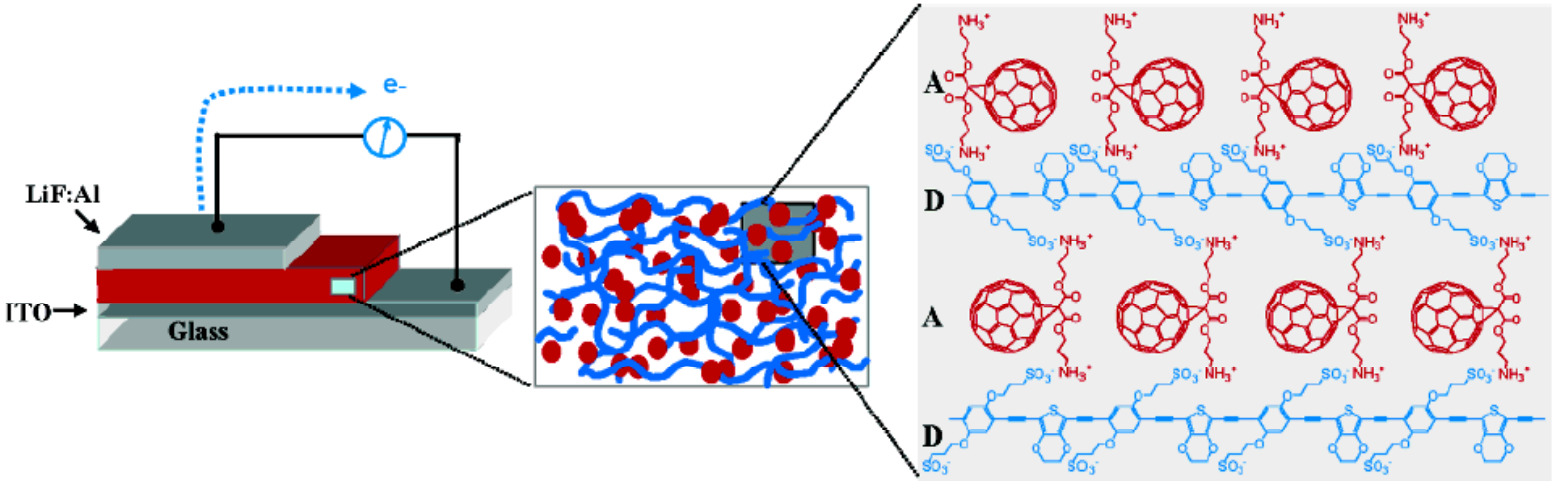


Figure 29.18. Schematic representation of the photovoltaic device structure of fabricated by LbL deposition with alternating electron donor (D) and acceptor (A) layers. (From Ref. 37 by permission of American Chemical Society.)

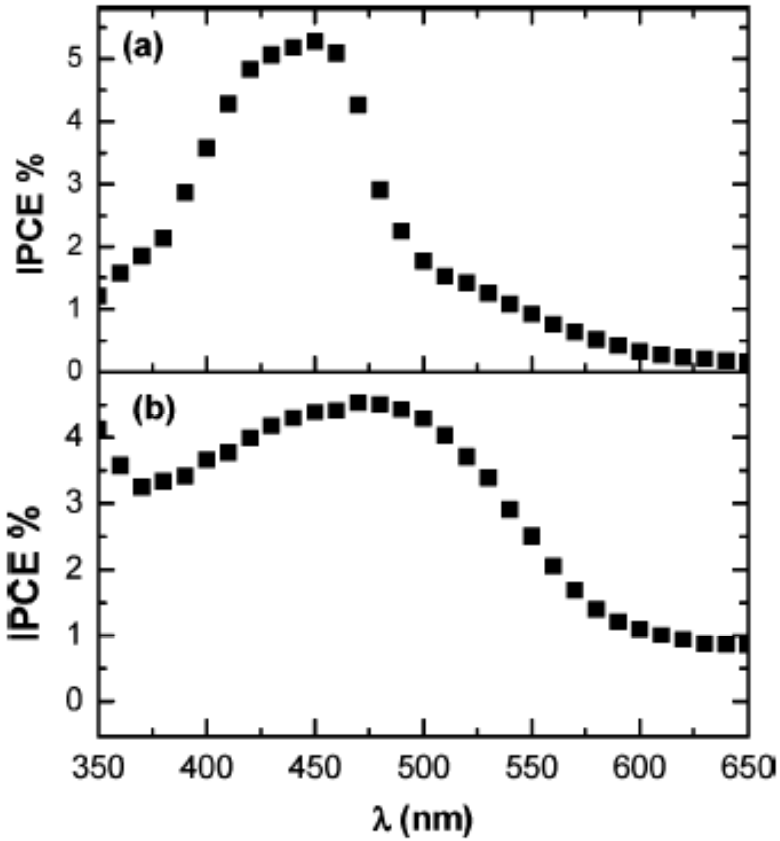


Figure 29.19. External quantum efficiency (also known as incident photon to current efficiency, ICPE) for photovoltaic devices fabricated by LbL deposition with two different PPE anionic derivatives and cationic C60. (From Ref. 37 by permission of American Chemical Society.)