

Punto quantico is involved in the production and development of innovative polymer-based inks with unique functional properties. Functional inks are used for fabricating supported-devices that can be exploited for industrial applications in different technological fields like: optics, photonics, microelectronics, renewable energy, anticounterfeiting, etc. Nanoscopic inorganic phases (metals or ceramics) are used to provide the embedding polymeric matrix of properties like fluorescence/phosphorescence, thermochromism, bright lightfast coloration, ferromagnetic/superparamagnetic properties, controlled dielectric properties, electrical/thermal conductivity, radiation shielding (magnetic fields, X-ray, infrared radiation, etc.), oxygen/water/hydrogen scavenging, catalytic/photo-catalytic activity, etc. Owing to the very small size of the functionalizing phase, the inks result perfectly transparent in the visible spectral range, therefore allowing multi-layer films depositions. In addition, the nanometric size of the functionalizing-phase makes possible accurate deposition of ultra-thin high-filled layers. Depending on the required performance, inks can be based on both thermoplastic polymer solution in volatile organic solvents or thermosetting resins (e.g., acrylic, epoxy, polysiloxane, etc.). The ink processing-conditions (ink viscosity and drying temperature/time) can be accurately controlled by selecting an adequate organic solvent or for resin-based inks the oligomer molecular weight. These functional inks can be used with many common deposition technologies like: Ink-Jet, Roll-to-Roll, Spin-Coating, Serigraphy, etc.

Some example of our products:

· **Fluorescent inks:** these inks produce by air-drying a layer of polymeric material able to emit light by exposition to UV-rays. The three fundamental coloration (green, blue, and red) in addition to many other colors are available.

· **Thermo-chromic inks:** these inks produce by air-drying a layer of polymeric material able to switch from a black to a yellow coloration at a special temperature value ranging between 100°C and 200°C, depending on the special ink formulation.

- **Transparent lightfast colored inks:** these inks produce by air-drying a layer of polymeric material colored by red, purple or blue. Since this coloration is based on the surface plasmon resonance of noble-metal particles it results of high intensity and stability also under prolonged solar light exposition.

- **High infrared-reflective inks:** these inks produce by air-drying a layer of transparent polymeric material containing a very high percentage of nano-sized gold particles that make the material able to efficiently reflect thermal radiation.

- **Inks for magneto-optical applications:** these inks produce by air-drying a plastomagnetic layer which is quite transparent in the visible spectral range and characterized by ferromagnetic or super-paramagnetic properties.

- **Diamagnetic inks:** these inks produce by air-drying a layer of diamagnetic material, consisting in a dispersion of bismuth nanoparticles in polymer. Such material is able to perfectly insulate the substrate from intensive external magnetic fields produced by permanent magnets, mobile phones, etc.

- **Radio-opaque inks:** the inks produce by air-drying a layer of polymeric material containing PbS nanoparticles able to shield the substrate from ionizing radiations (e.g., X-Ray, γ -Rays, etc.).

- **Antiseptic inks:** these inks produce by air-drying a layer of polymeric material containing nanoparticle of silver or bismuth able to accomplish an intensive antibacterial action.

- **Dielectric inks:** these inks produces by air-drying a layer of polymeric material with high-tunable dielectric properties adequate for high-frequency capacitors (is controlled by the presence of metal or ceramic nanoparticles).

A number of other functional inks like: UV or IR absorbers, antistatic, catalytic, etc. are also available.