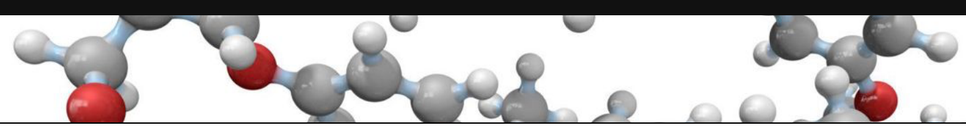
MIPAX™

MIPAX™ is a molecular-level information technology in which digital data is not stored in electronic memory but is physically recorded within the volume of a specialized photopolymer material through precisely controlled physical and photochemical processes.



CORE PRINCIPLE

Three-Dimensional Structural Modification

The core principle of the system is the creation of three-dimensional structural modification inside the material using light. Controlled coherent light fields generate an interference pattern within the volume, locally initiating polymerization. As a result, nanoscale refractive index modulation is formed throughout the material. The information is not located on the surface; it exists as a physical state of the material's molecular structure.

DATA DENSITY

Volumetric Recording & Wavefront Reconstruction

This volumetric recording mechanism enables extremely high data density. Because the system stores not only intensity but also phase information, it is capable of recording complete optical wavefronts. Under appropriate optical readout conditions, the original interference field is reconstructed, and the material restores the originally recorded wavefield.

SECURITY

Physics-Based, Tamper-Proof Authentication

The resulting molecular structure cannot be reproduced without distortion. The recorded interference pattern contains analog wave-optical information, and accurate replication would require the precise recreation of the original coherent light field, material dynamics, and the entire exposure environment. In practice, this cannot be physically achieved without measurable distortion. Security therefore does not rely on algorithms or digital encryption, but on the fundamental laws of physics.

APPLICATIONS

Ideal Platform for Brand Protection

As a result, MIPAX™ provides an ideal platform for security, brand protection, and anti-counterfeit applications. The technology enables the recording of complex optical codes and unique identifiers within the material's volume. Each generated structure possesses its own unique optical "fingerprint," which cannot be cloned without distortion, ensuring physics-based, tamper-proof authentication.

PHOTOPOLYMER MOLECULAR STRUCTURE — BALL-AND-STICK MODEL

TRUE SPATIAL HOLOGRAPHIC VISUALIZATION

Genuine Three-Dimensional Holographic Display

One of the most significant outcomes of MIPAX™ is the realization of genuine three-dimensional holographic display. The combination of extreme data density, volumetric interference patterns, and nanoscale refractive index modulation enables full wavefront reconstruction. As a result, the material produces a physically real spatial holographic image.

The displayed image is not a projected illusion, not a two-dimensional diffractive effect, and not a digitally generated visual trick. The reconstructed wavefield restores optical information that exists in space, providing authentic depth perception and natural parallax.

NO AUXILIARY DEVICE REQUIRED

Directly Visible to the Human Eye

This means that true holographic visualization becomes directly visible to the human eye for the first time without the need for any auxiliary device, such as glasses or specialized displays.

With this capability, MIPAX™ represents not only a breakthrough in security applications, but also opens the door to new industrial and consumer product categories. Real spatial holographic visualization can become a future visual platform where physical information and visible three-dimensional representation form a unified system.

MIPAX™ does not simply store information or display images. It opens a new dimension in the world of material-embedded, physically reconstructable spatial information.

"Security therefore does not rely on algorithms or digital encryption, but on the **fundamental laws of physics.***"*