

Hiding in Plain Sight

Accelerating adoption of advanced wireless technologies using transparent antennas.



When antennas need to be everywhere, how can they be seen nowhere? Engineers know successfully implementing emerging technologies such as 5G or Wi-Fi 6 will require more antennas closer to people, but achieving this level of aerial density brings not only visual blight but security concerns. For antenna and RF engineers implementing any technology reliant on wireless connectivity, there's a new technology for keeping antennas out of sight and out of mind – without compromising performance.



Despite increasing interest in advanced wireless technologies such as 5G and Wi-Fi 6, enterprises and organizations are slow on the uptake. The enticement of dramatic performance improvements such as faster speeds, lower latency, increased data capacity, and broader device types at greater density have yet to overcome reservations due to risks and uncertainties including the constantly evolving 5G standard, multiple 5G spectrums, multi-carrier requirements indoors, very high densities

of increasing device types, new commercial ways of selling network capabilities such as “network slicing”, or new use cases and user types. Enterprises and organizations desire connecting employees, machines and customers wirelessly for innovative technologies including AI, AR, V, IoT, Cloud, XaaS, Smart-buildings and Edge Computing that are perceived as foundational to transforming their businesses – all of which necessitating more higher bandwidth connections to the network with greater robustness (and many more of them). Transparent antennas made from CHASM’s AgENT platform invisibly solves the density issue across all of these advanced wireless applications.

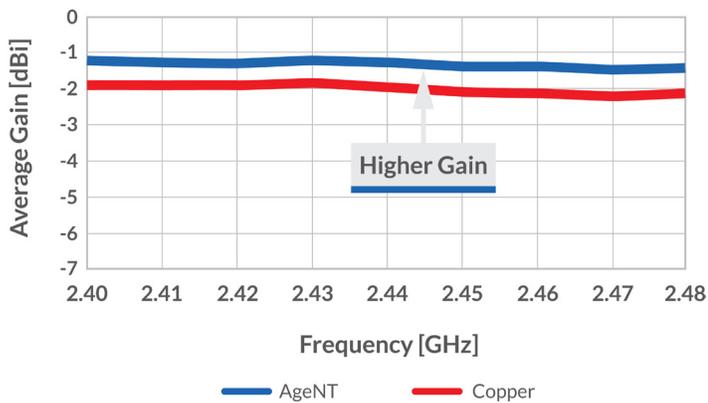
WHAT ARE NANOTUBE HYBRIDS?

A Nanotube Hybrid is the deliberate combination of carbon nanotubes and another element such as carbon, graphite, silver or copper to unlock entirely new properties and performance characteristics. CHASM uses proprietary processes to create Nanotube Hybrids using our industry leading, premium single wall carbon nanotubes. Manufactured in the USA, the resulting Nanotube Hybrids are applied in precise ways to make ordinary industrial and consumer products do extraordinary things.

When used for printed electronics, nanotube hybrids enable product designers and engineers to create transparent and flexible 5G antennas that can be seamlessly added to lights or windows or even applied to screen displays or automobile windows, creating invisibly located antennas where they can provide optimal performance with minimal negative visual impact.

AgeNT ANTENNA BENEFITS

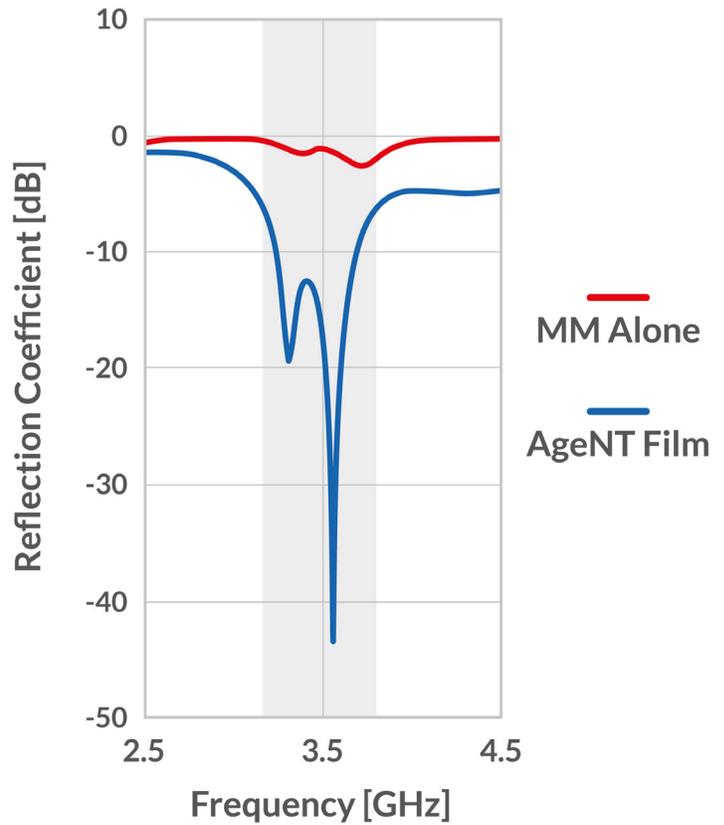
Transparent antennas made using AgeNT films offer performance equal or better to traditional copper antennas. Flexible, formable and approximately 103 μm in thickness, AgeNT transparent antennas are easy to apply to windows, overhead lighting or even on the outside of enclosures to unobtrusively blend into the surroundings delivering maximum performance. Fabricated using cost-effective and readily available screen printing, AgeNT transparent antennas require minimal tooling investment, support quick design turns and rapid scale to production levels through an ample selection of available fabricators.



The Nanotube Hybrid antenna produced higher gain particularly in the antenna primary direction.

AgeNT PRODUCT DESCRIPTION

AgeNT™ transparent conductive films are flexible and formable with low patterning costs and superior optoelectronic performance of low sheet resistance at high transparency. Leading companies across multiple industries have successfully launched their next generation innovations using transparent touch sensors and buttons, heaters, antennas, and EMI shielding films made from advanced Nanotube Hybrid materials only available from CHASM. Comprised of a nanoscale copper metal mesh on a transparent plastic substrate, any desired antenna patterns are screen printed using CHASM's proprietary ink. Two models of AgeNT-1 are readily available offering transparency of 95% VLT with a sheet resistance of $1.0 \Omega/\square$ or transparency of 85% VLT with a sheet resistance of $0.2 \Omega/\square$.



Reference AgeNT antenna demonstrated superior performance – particularly in the desired 3.2 – 3.8 GHz range.

ABOUT CHASM ADVANCED MATERIALS

CHASM Advanced Materials, Inc. is the inventor and manufacturer of Nanotube Hybrids – a new class of advanced material used by global manufacturers of commercial and industrial products to dramatically improve device technology, transportation, infrastructure, healthcare, and natural resources. Leading companies across multiple industries have been first to market with their future products using AgeNT™ for transparent flexible printed electronics, NTeC™ for battery, coating, or performance additives, and Signis™ for touch buttons and sensor with superior environmental stability.

TALK TO AN EXPERT

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