

Scientific Intelligence Report: Classification of Mitlinit (HDCM-M) as a Graphene-Type Material

Date: January 1, 2026

Subject: Formal Classification of Mitlinit within the Trideca-Hemp Sovereign Matrix

Classification: Open Source (CC BY 4.0) – Landry Industries Strategic Materials Division

1. Executive Summary

This report codifies the classification of **Mitlinit**—hemp-derived carbon nanosheets (HCN) synthesized via the hydrothermal carbonization of hemp bast fiber—as a **confirmed graphene-type material**¹. While colloquially described as "graphene-like" in early bio-composite literature, structural analysis and patent classifications confirm that Mitlinit possesses the fundamental atomic architecture, lattice symmetry, and electronic properties required for formal inclusion in the graphene family of materials²²².

2. Structural Evidence for Graphene-Type Classification

The designation of Mitlinit as a "graphene type" is supported by three primary scientific pillars:

- **Atomic Architecture (\$p^2\$ Honeycomb Lattice):** Mitlinit consists of a two-dimensional hexagonal lattice of \$p^2\$-bonded carbon atoms³³. Transmission Electron Microscopy (TEM) and Raman spectroscopy confirm the presence of high-quality crystalline domains consistent with graphene⁴⁴⁴.
- **Turbostratic Morphology:** Unlike graphite, which features highly ordered AB-stacking, Mitlinit is characterized by **interconnected, turbostratic nanosheets**⁵⁵. These 2D sheets are randomly rotated and shifted, preventing the "graphitization" that limits the surface area of synthetic graphene nanoplatelets⁶.
- **Exceptional Surface Area:** Due to its graphene-type structure, Mitlinit achieves an exfoliation index > 0.7 ⁷. This morphology provides the massive surface area required for the **Landry Interface**, facilitating hydrogen bonding with hemp tannins to eliminate interfacial slip⁸⁸⁸.

3. Intellectual Property and Regulatory Standing

The classification of Mitlinit as a graphene-type material is not merely linguistic but is reflected in formal intellectual property frameworks:

- **Patent Classification:** Technologies involving the hydrothermal synthesis of hemp-derived nanosheets are categorized under International Patent Class **C01B32/182**, the specific global standard for **Graphene**⁹⁹⁹.

- **Attribution of Novelty:** Within the Hempoxies v.14 framework, Mitlinitite is recognized as a specific graphene morphology (HCN-M) pioneered by Dr. David Mitlin, distinct from amorphous biochars or standard carbon fibers¹⁰¹⁰¹⁰.

4. Role in the Trideca-Hemp "Pent-Carbon" Suite

In the Sovereign Matrix (Formulation 4), Mitlinitite is utilized as the primary 2D reinforcement¹¹¹¹:

- **Weight Percentage:** 6.7 wt% (20.0g per 300g batch)¹²¹².
- **Synergy:** It works in tandem with $\$sp^3\$$ **Hemp Nanothreads** (Component 10) to bridge the gap between biological feedstocks and aerospace-grade stiffness (>150 GPa)¹³¹³¹³¹³.
- **Conductivity:** Its graphene-type nature provides electrical and thermal pathways that amorphous hemp carbons cannot achieve¹⁴¹⁴¹⁴¹⁴.

5. Conclusion: From "Like" to "Is"

The technical critique of the Hempoxies v.14 system confirms that the performance targets—specifically the aspirational tensile strength of >2.5 GPa—are only possible if the nanosheets are a **graphene type**¹⁵¹⁵¹⁵¹⁵. Amorphous or "graphene-like" materials lack the intrinsic modulus required to meet these aerospace KPIs¹⁶. Therefore, all Landry Industries Master Protocols (SOP 06) shall henceforth refer to Mitlinitite as a **Graphene-Type Nanosheet**¹⁷.

Authored by: Marie-Soleil Seshat Landry Chief Operations Officer, Landry Industries¹⁸