Mitigating Light Pollution from Satellites: Materials and Technologies Needed for Sustainable Space Environment

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Introduction

- The **commitment of the Nigerian Space Agency – NASRDA to space sustainability cannot be overemphasized**; especially on the space artificial light and light pollution challenges.

- **NASRDA** is the **regulatory body of space activities in Nigeria**, and there was a **recommitment** during the **Stakeholders Conference on the Regulation of Space Activities** in Nigeria held in April, 2025.

- Hence, the Nigerian Space Agency is **in the process** to make **policy** as regards light pollution in space in her contest.

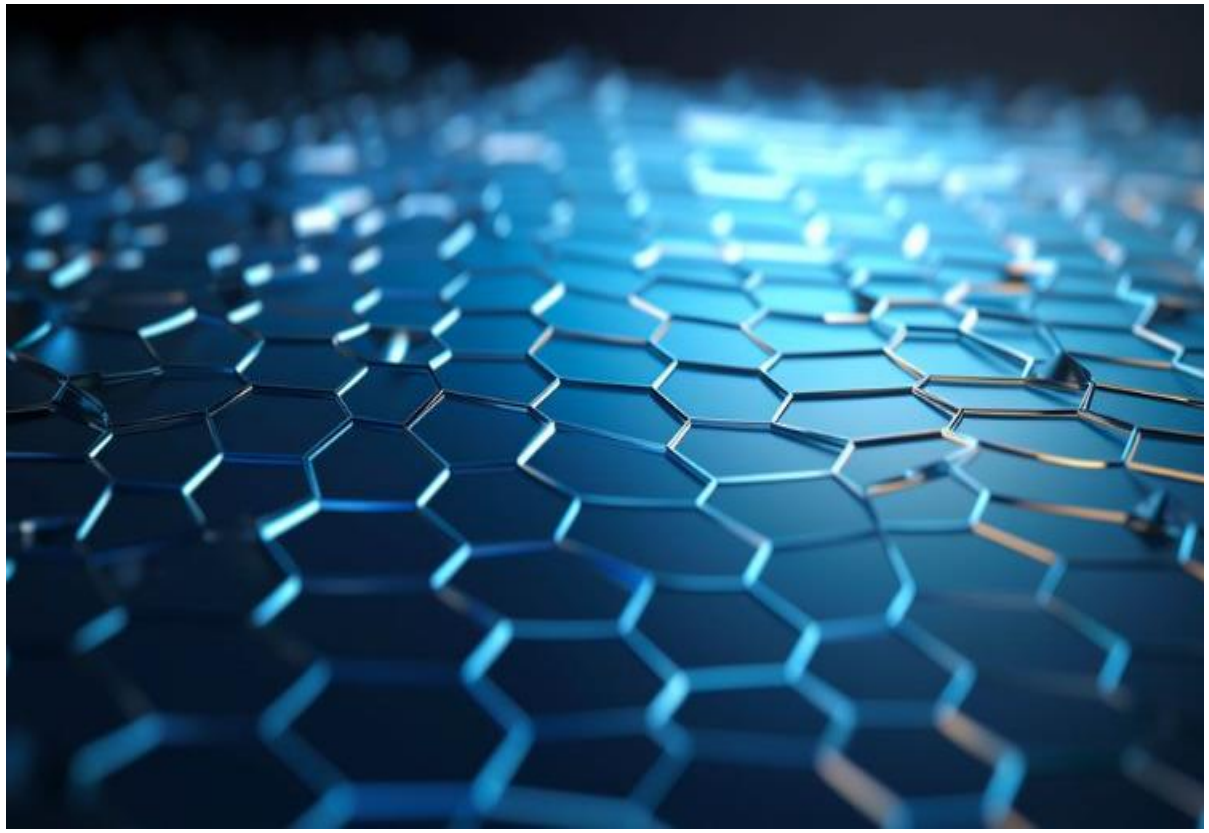
Capacity Building, Enlightenment and Research on Mitigating Space Light Pollution

- As NASRDA is **in the process** to make **policy** as regards light pollution in space in her contest; however there is capacity building, enlightenment and research on **mitigating light pollution from satellites**.

- **Through study it has been discovered that there are materials and technologies that mitigate light pollution from satellites**, ensuring a more sustainable space environment.

Materials and Technologies that Mitigate Light Pollution from Satellites

- Vantablack 310 is a super-black satellite **paint that absorbs 98% of light across the visible and near-infrared spectrum**. It's durable, easy to apply, and resistant to harsh space conditions. Having efficacy as a **hull-darkening solution [1]**.
- Study Confirms **Dark Coating Can Reduce Satellite Reflectivity**.
- Dielectric Mirrors is an in-house technology **using dielectric mirrors to absorb and redirect light away** from the ground, minimizing satellite brightness **[2]**.
- **Dark paint** can be used on angled surfaces or those not conducive to mirror adhesion to reduce light reflection.
- **Sunshades are now being tested to shield satellites' antennas** from sunlight and reduce light pollution.



Materials and Technologies that Mitigate Light Pollution from Satellites Cont'd

Solar reflective films are used in a range of satellite applications to provide thermal management solutions while controlling visual glare, these include:

- **Fluorinated Ethylene Propylene (FEP)** with Silver Inconel that provides thermal and electrical insulation, oxidation prevention, and brightness mitigation [3];

- **Aluminized PET (Polyethylene Terephthalate – polyester)** Films is lightweight, cost-effective option for brightness mitigation and thermal control;

- **Polycarbonate Films** with silver coatings combines reflectivity and durability for brightness mitigation;

- **Silicone Adhesives** are durable and temperature-resistant adhesives for bonding brightness mitigation films to satellites.

Hence, depending on the requirements, the listed are the currently available solar reflective films.

Conclusions

In all, enlightening at the grassroots and capacity building of stakeholders are key to mitigating light pollution from satellites. However, continual study and research allows progress in this combat.

Thank you for your attention!

For Collaborations/ Comments/ Suggestions/ Questions
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Selected References

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[2] https://www.chinafluoropolymer.com/info/what-is-fep-insulation-jacket-and-when-to-use-100439296.html

[3]https://avantierinc.com/solutions/custom-optics/broadband-dielectric-mirrors/#:~:text=The secret to how dielectric,total reflection exceeding 99pe