Graphene coatings for solar cells and panels

info@riiigroup.com |
instrumentri@gmail.com
www.riiigroup.com
|www.rinanotech.com

Introduction

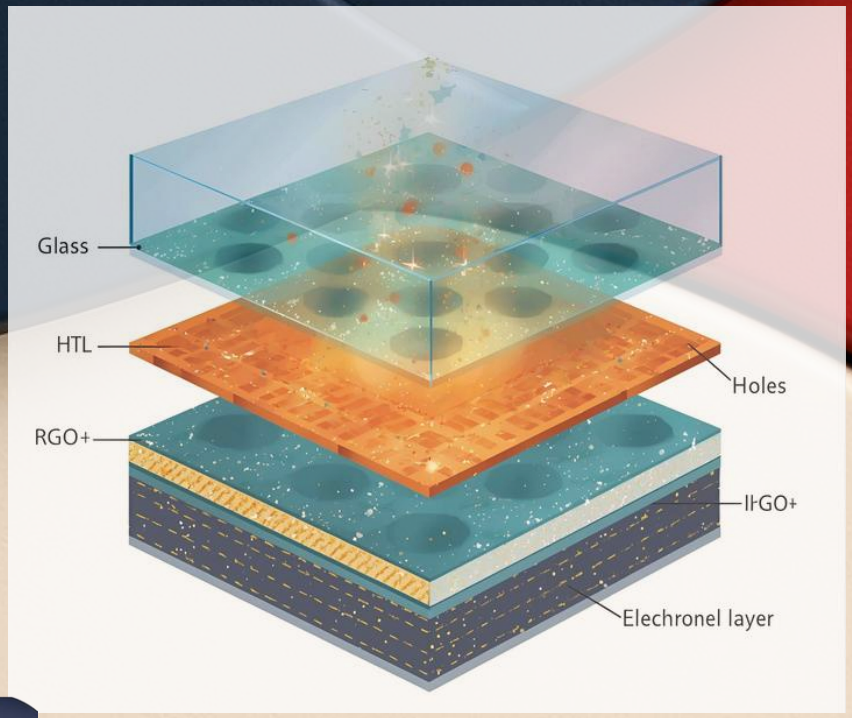
Introduction – Why Graphene Oxide in Solar?

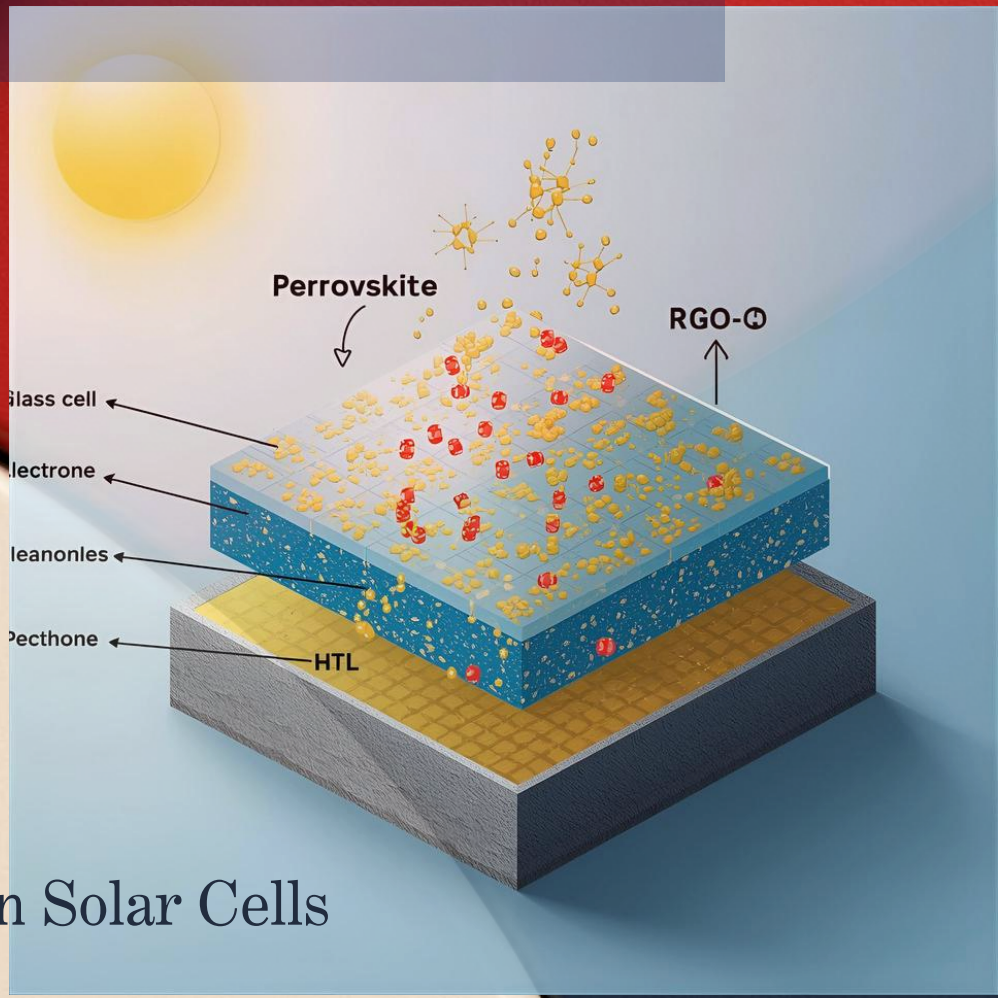
- Solar efficiency is limited by conductivity, transparency, and interface losses.
- Graphene oxide (GO) and reduced graphene oxide (rGO) offer:
  - High conductivity (rGO)
  - Tunable bandgap (GO)
  - High transparency & surface area
  - Mechanical flexibility

Comparison with Traditional Solar Cell Materials

Material	Conductivity	Bandgap Tunability	Transparency	Cost	Flexibility
ITO	Moderate	Fixed	High	High	No
GO	Low–Medium	Tunable	High	Low	Yes
rGO	High	Slightly Tunable	Medium–High	Low	Yes

- GO: Hole transport layer (HTL), interfacial buffer, and transparent electrode
- rGO: Conductive electrode layer, electron transport layer (ETL)
- Performance Enhancement:
  - ↑ Charge extraction
  - ↓ Recombination
  - ↑ Mechanical strength for flexible solar cells

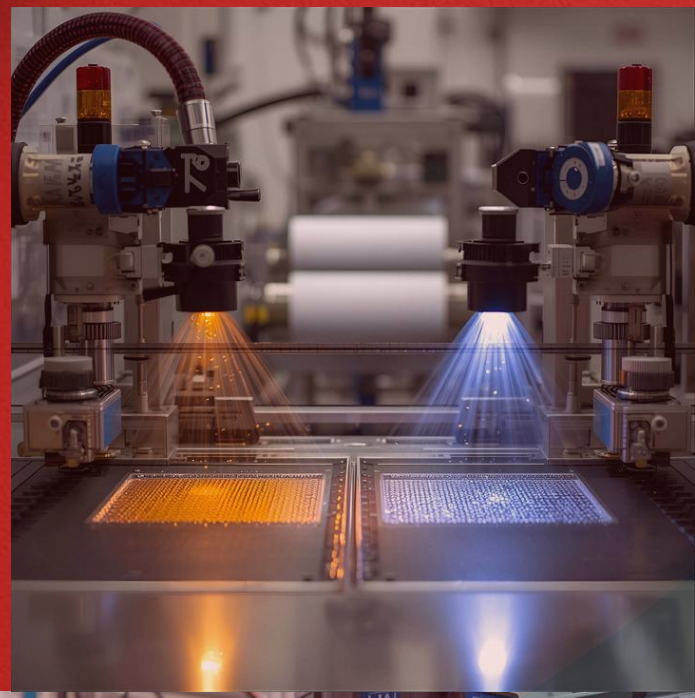


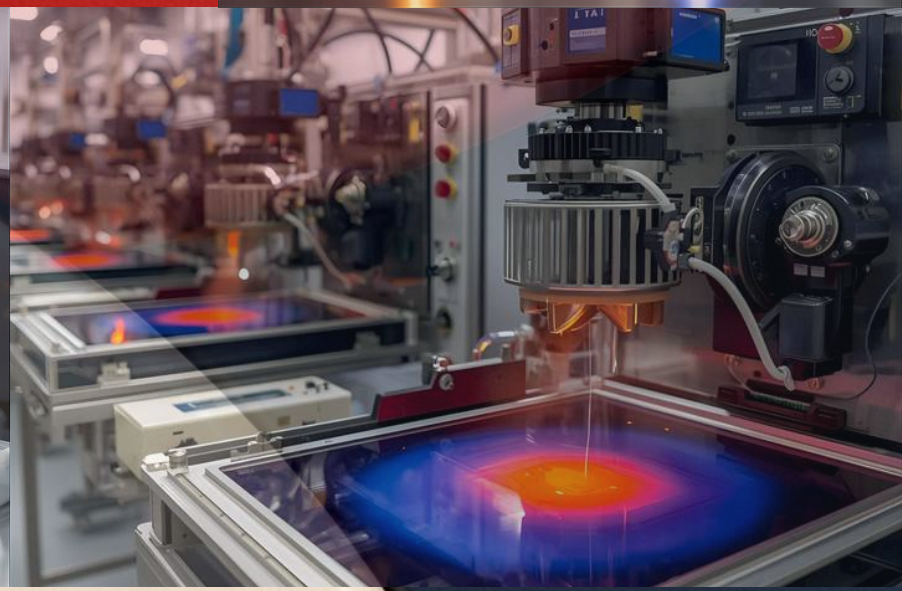


Functional Role of GO & rGO in Solar Cells

Integration Methods

- Spray Coating / Spin Coating of GO thin film
- Polymer over coating on solar cells post bonding
- Thermal/chemical reduction to rGO
- Compatible with:
  - Silicon Solar Cells (PSC)
  - **Ge** - Ga PV (Space grade PV)
  - Dye-sensitized Solar Cells (DSSC)
  - Heterojunction Silicon Cells

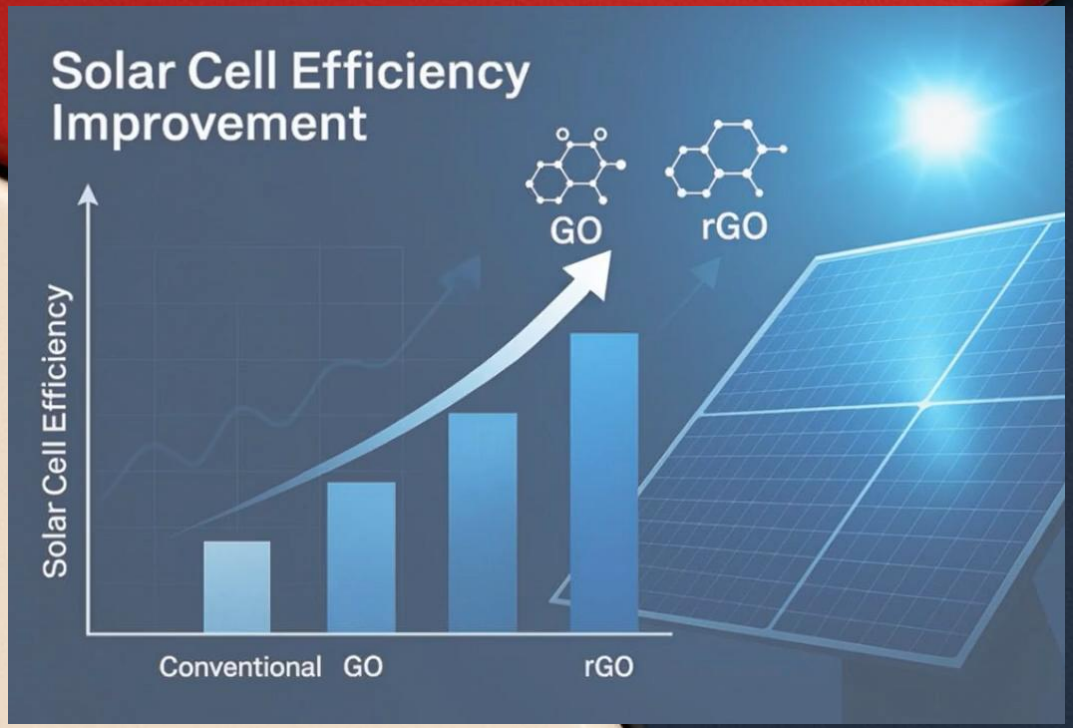




- Performance & Value Analysis

Performance Results

- GO-based HTL → 20.1% efficiency enhancement
- rGO electrode → increased stability under UV for 1000 hrs
- ↓ 40% interfacial resistance with rGO/metal hybrid electrodes



Financial and Market Opportunity

🌞 Global flexible solar cell market → $5B by 2030
👷 Lower CAPEX for startups using rGO vs ITO deposition
♻️ Supports circular economy with lower waste heat

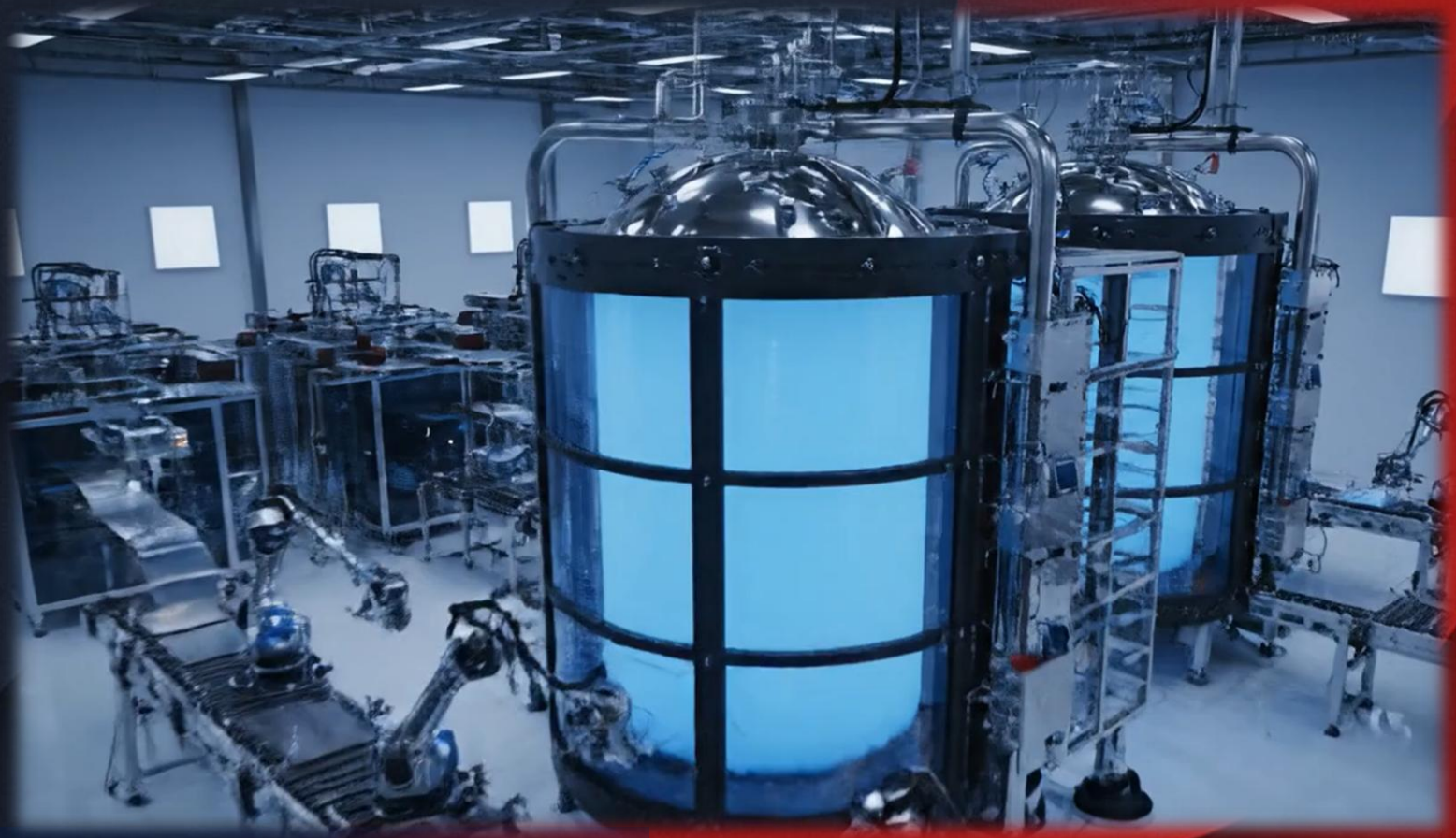
Advantages for Industry

- Cost-effective replacement for ITO & PEDOT:PSS
- Easy to scale coating (spray, inkjet, roll-to-roll)
- Eco-friendly, non-toxic synthesis (for GO)
- Enables semi-transparent or flexible solar tech

Why Partner with RI Group?

"We're not here to sell a chemical. We're here to help you lead the revolution."

- High-quality GO & rGO dispersions (various solvents)
- Customized formulations for HTL/ETL/electrode
- Scale-up support and solar integration partners
- 🔧 Pilot tests + data sheets + technical onboarding



📞 **Connect for pilot demos, compatibility mapping, or collaboration** 📧

- info@riiigroup.com | instrumentri@gmail.com |
- 🌐 www.riiigroup.com |www.rinanotech.com