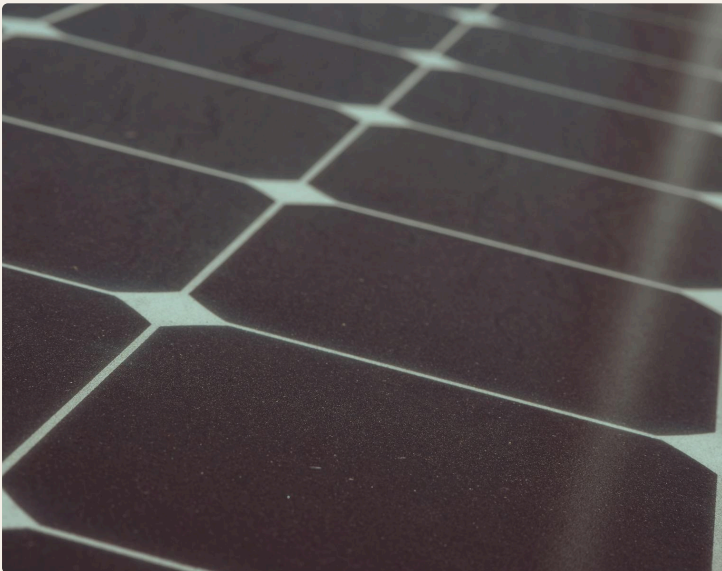


LORH LA SENG

Commercial Sole Company Limited

Low-Iron Quartz for PV Cover Glass

Hydrothermal Vein Origin | No Sedimentary Iron Overprint



Sector reference — photovoltaic module surface



LLS premium streak — Fe₂O₃ floor 30 ppm

Fe₂O₃ 30 – 150 ppm

PREMIUM HAND-SORTED STREAKS

Vein, Not Sand

NO SEDIMENTARY IRON OVERPRINT

Single-Deposit

REPEATABLE CHEMISTRY MONTH-TO-MONTH

For PV glass mills exploring non-sedimentary, low-Fe ASEAN-origin alternatives to Vietnamese/Indian sand

About Lorh La Seng

Lorh La Seng Commercial Sole Co., Ltd. operates hydrothermal vein-quartz deposits in Bolikhamxay Province, Lao PDR, dedicated to supplying **lump quartz feedstock** for low-iron quartz feedstock for PV cover glass and ultra-clear architectural glazing. Our ROM ore is naturally high-purity (SiO_2 99.5–99.89%), with iron content already low enough for most downstream processes — without acid leaching or flotation. With a government-granted export quota of 120,000 MT/year (Mine 1) and a further 500,000 MT/year coming online in 2027 (Mine 2), we offer scale, consistency, and long-term supply security for PV glass formulators across Asia.



Exposed quartz vein — clean white crystalline silica



Hand-sorted premium streaks — visible iron-free zones

PV / Solar Glass Suitability

Glass Product	Fe_2O_3 Limit	Light Trans.	LLS ROM Fit
Standard PV cover glass	≤ 150 ppm	$> 91\%$	✓ Premium streaks (30–150 ppm)
High-transmission AR glass	≤ 100 ppm	$> 93\%$	⦿ Low-Fe lots, hand-sorted
Ultra-clear / anti-iron PV	≤ 80 ppm	$> 94\%$	⦿ Premium hand-sorted only
Bifacial PV rear-side glass	≤ 200 ppm	$> 90\%$	✓ Bulk tolerance
BIPV architectural glazing	≤ 300 ppm	$> 88\%$	✓ Comfortably exceeds

ATIGA 0% Import Duty + 0% VAT: Lao PDR origin qualifies for zero import duty into Vietnam, Thailand, Indonesia, Malaysia, Philippines, and all ASEAN member states under the ASEAN Trade in Goods Agreement. Combined with 0% VAT for export-processing enterprises, **LLS feedstock delivers ~30% lower landed cost** versus domestic-sourced quartz across Southeast Asia.

Note: Light transmission depends on glass thickness, surface coating, and Fe oxidation state (Fe^{2+} vs Fe^{3+}), not just Fe_2O_3 ppm in feedstock. Hydrothermal vein quartz typically yields lower Fe^{2+} during melting versus sedimentary sand — relevant for high-transmission applications. Pilot melt trials available on request.

Why LLS for PV Glass Formulators

1. Hydrothermal vein, not sand. The crystal grew clean from a hydrothermal source, not deposited through an iron-rich sedimentary basin. No structural iron ceiling — what beneficiation can achieve depends on starting material, and ours starts low. **2. Premium streaks demonstrated.** Fe_2O_3 floor of 30 ppm on hand-sorted premium vein streaks per Guanlong XRF; majority of bulk ROM stays below 200 ppm. **3. Repeatable, not lottery.** Single-deposit chemistry holds month to month — important when the glass plant retunes its melt only on confirmed feedstock change. **4. ASEAN-origin alternative.** For PV glass mills hedging supply concentration risk away from Vietnamese sand or Indian quartz, Lao PDR origin offers ATIGA 0% duty + non-sedimentary geology in one package. **5. Pilot-scale samples.** 5–20 MT pilot lots of hand-sorted premium streaks available for melt trials. **6. Long-term supply security.** 120k MT/yr today scaling to 620k MT/yr from 2027 — sized for long-term offtake by major glass mills.



Hand-sorting line — premium low-Fe streaks separated from bulk ROM

Target Customers & End Uses

Chinese PV Glass Mills

Xinyi Solar, Flat Glass Group — non-Chinese feedstock for tariff-arbitrage / supply diversification

Vietnamese PV Glass

CFG Glass, VICO PV Glass — domestic Lao→VN ATIGA route

Indian PV Glass

Borosil Renewables, Vishakha Solar Films — competitive freight to West India ports

ASEAN Anti-Reflective Glass

AR-coated automotive + architectural glass producers

BIPV Module Manufacturers

Building-integrated PV — Korea, Japan, Vietnam

Bifacial PV Rear-Side Glass

Tempered low-Fe rear-glass for bifacial module manufacturers

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