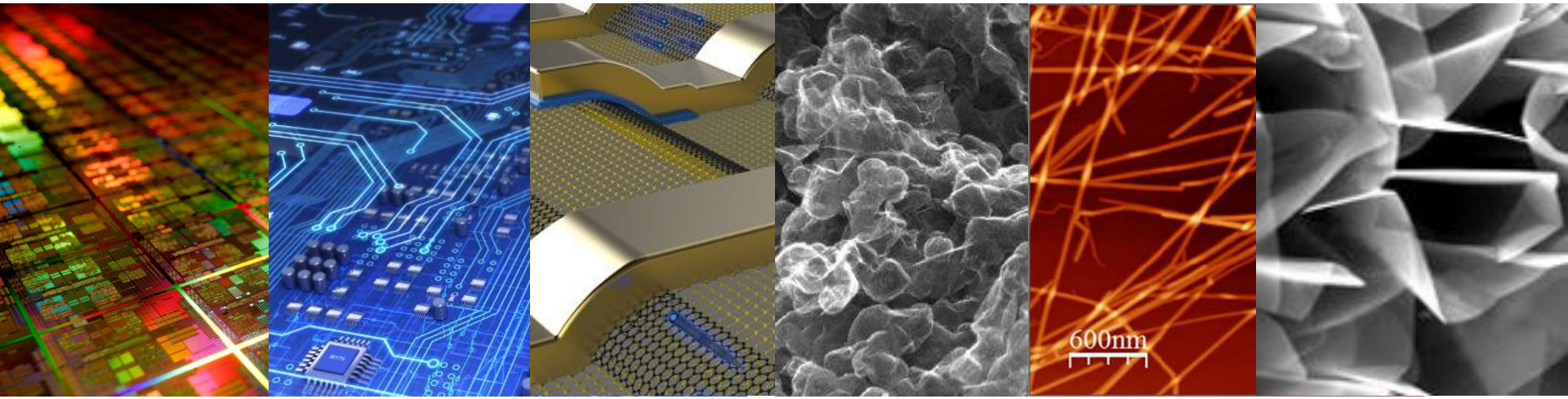
Enabling your Technology



Commercialising Particle Metrology - What Impact Metrology Has on the Market?

Dr Denis Koltsov
Director of BREC Solutions

RSC/ISO meeting
2025 London (Teddington)

Speaker

Expert duties

- Expert on ISO TC229 (Nanotechnologies)
- Expert / HoD on ISO TC24/SC4 (Particle Characterisation)
- Expert on ISO TC281 (Fine Bubble Technology)
- Expert on CEN TC352 (Nanotechnologies)

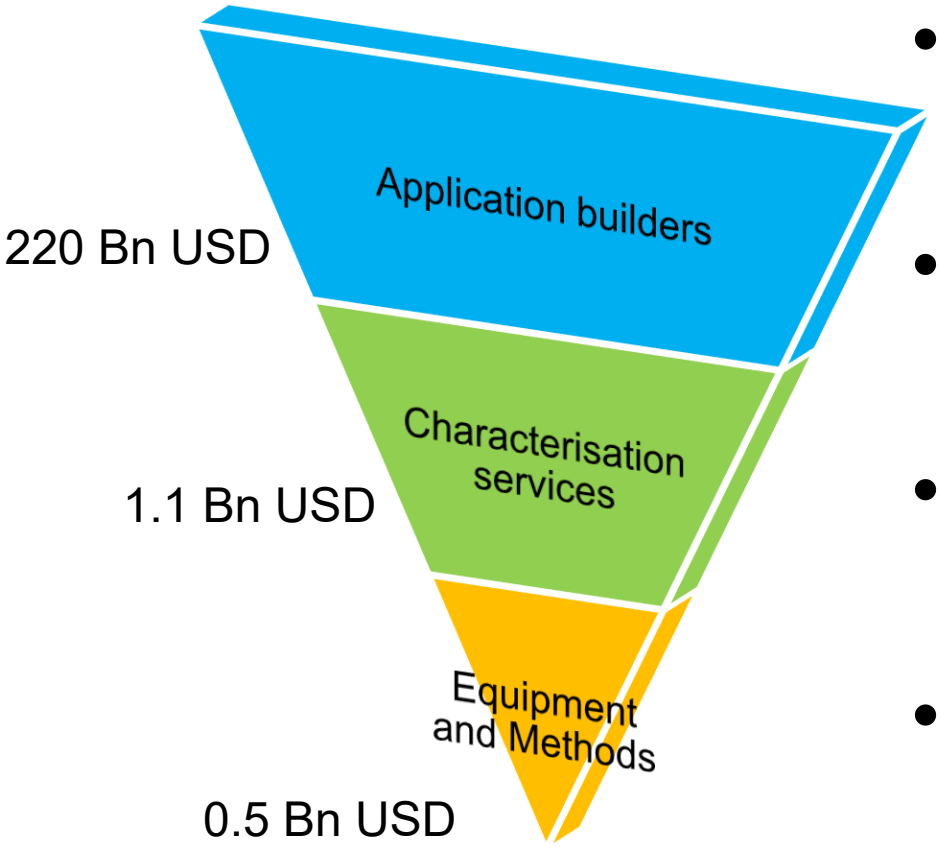
Business

- Director, Founder and owner of BREC Solutions
- Distributor of HORIBA ViewSizer 3000 in EU

Disclaimer

Some views and data presented during this talk are my own and do not represent an official UK or BSI positon.

Summary



- Main beneficiaries of characterisation
- Instruments and methods
- Characterisation Services
- Application builders

Instruments and Methods

Method (equipment)	2025 share (range)	2025 estimate (USD)
Laser diffraction	**33–38%**	**$175M**
Dynamic Light Scattering (DLS)	**22–28%**	**$125M**
Dynamic/automated imaging (incl. microscopy-based size analyzers)	**13–17%**	**$75M**
Nanoparticle Tracking Analysis (NTA)	**10–14%**	**$60M**
Electrical Sensing Zone (Coulter principle)	**6–9%**	**$35M**
Sedimentation / sieves / other legacy & niche methods	**5–8%**	**$30M**

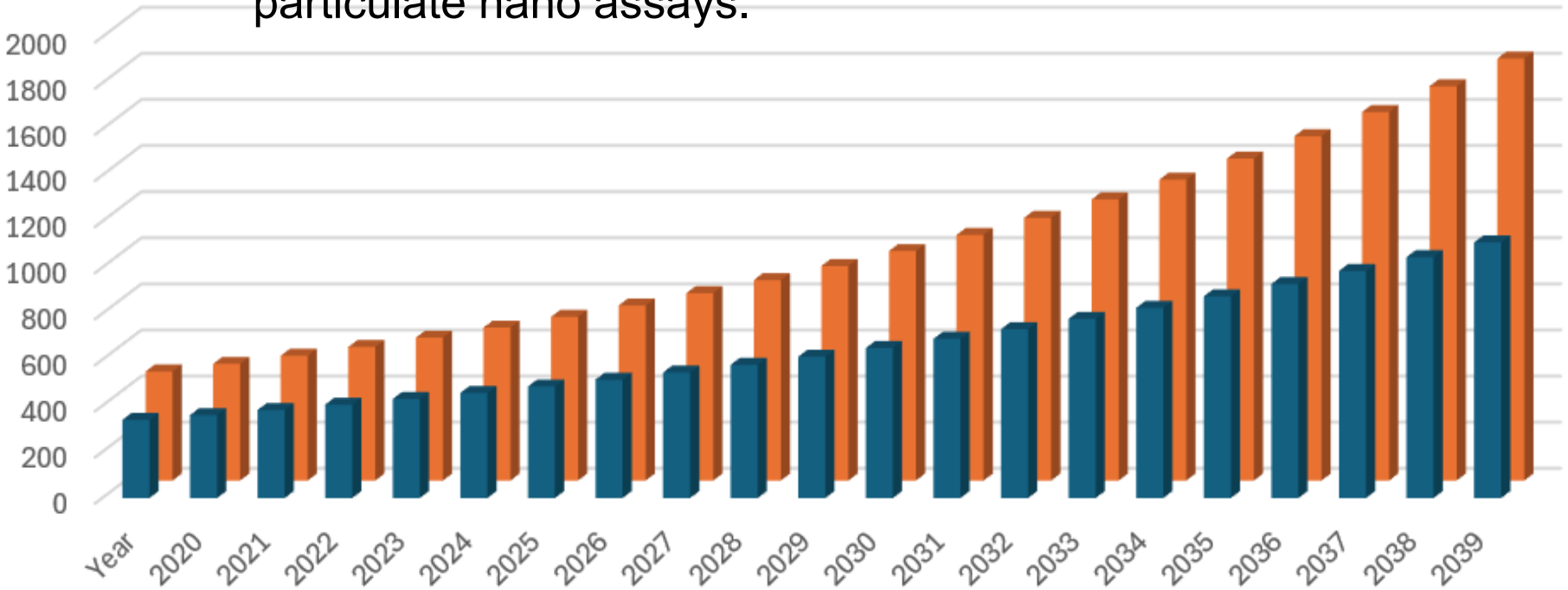
Characterisation Services

- Global **TIC** (testing/inspection/certification) services in 2025 sit in the **$240–420 B** band depending on source.
- Within this, **laboratory testing services** specifically are **~$113 B in 2025**, a more relevant parent bucket.
- **Materials testing services**—the slice relevant to powders/particulates—are variously scoped, but recent service-only estimates cluster in the **$15–25 B** range; some studies quote ~$25 B for 2025.
- Particulate-centric testing (PSD, morphology, BET/porosity, zeta, contamination, cleanliness, method validation & certification) is a **single-digit %** of materials testing—consistent with the activity mix in metals/minerals, pharma, chemicals, AM, battery, and food.

Characterisation Services

Bottom-up anchors from niche reports:

- **Particle size testing services** alone are cited around **~$0.5 B in 2024 → ~$0.53 B in 2025** (mid-single-digit growth).
- **Nanotechnology analytical testing services** are reported higher (broad nano analytics, not only particles) at **~$2.5 B (2025)**—useful as a **high-side check** given it includes non-particulate nano assays.

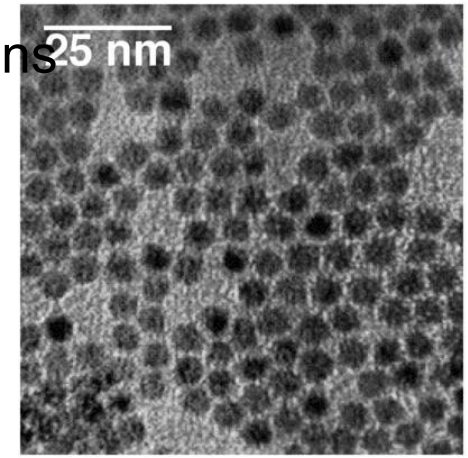


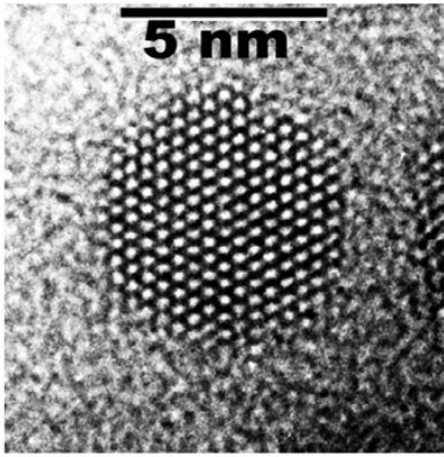
Application builders

- Indicative 2025 anchors inside this bucket (non-overlapping as far as practical):
- **Calcium carbonate (GCC+PCC):** ~USD **55–65B**.
- **TiO_2:** ~USD **22–25B**
- **Carbon black:** ~USD **22–29B**
- **Battery materials – cathode/anode powders: low-20s to mid-40s B** (range reflects source variance; cathode alone ~USD **37.8–44.8B** in 2025).
- **Precipitated + fumed silica:** ~USD **6–7B** combined.
- **Iron-oxide pigments:** ~USD **2.4B**.
- **Engineered nanomaterials (nano-only):** ~USD **16.7–19.5B** (this slice is already “nano” by definition).

Applications – Quantum dots

- 1. Display Technology
- 2. Solar Cells
- 3. LED Lighting Applications
- 4. Biological Imaging and Medical Diagnostics Applications
- 5. Quantum Computing Applications
- 6. Sensors and Biosensors Applications
- 7. Memory Devices Applications
- 8. Quantum Dots for Paints and Coatings
- 9. Security Inks and Anti-counterfeiting
- 10. Quantum Dot Lasers



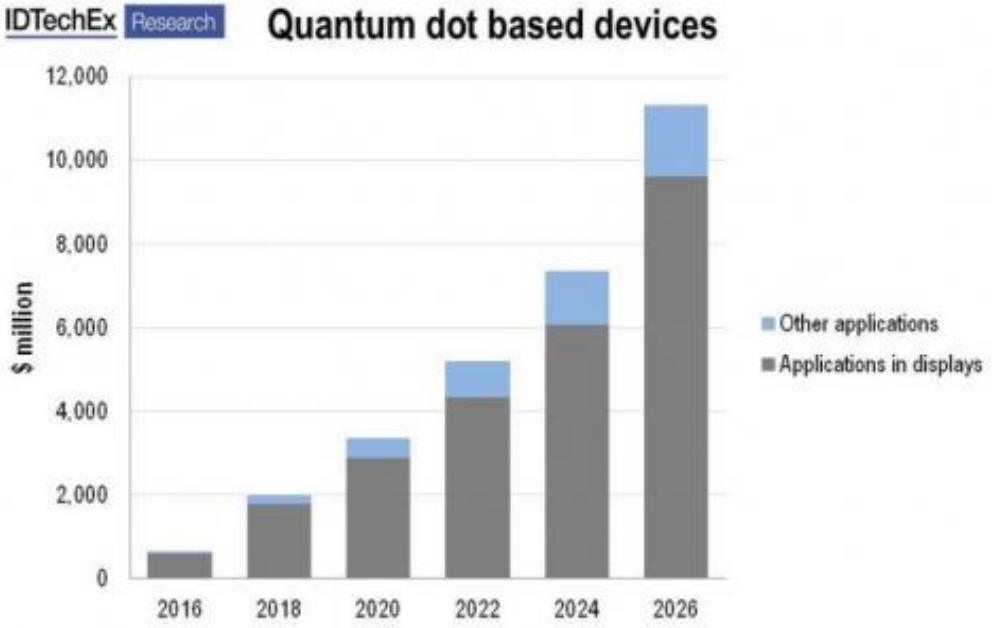


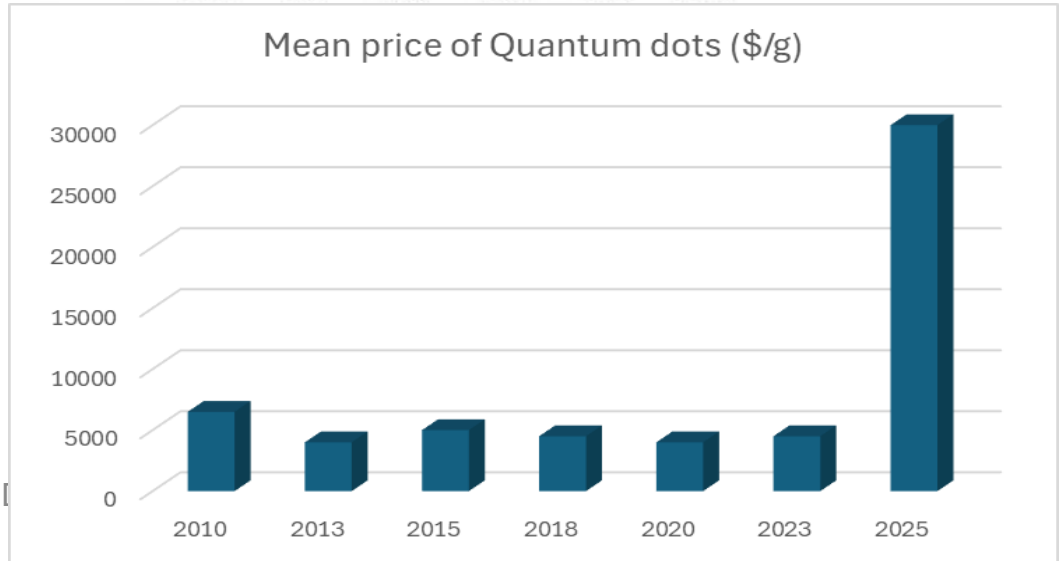
Quantum Dots Markets

Despite a relative calm in terms of technological hype Quantum dots market keeps on growing. By 2029 it is said to reach approx. 23 Bn USD.

QDs are becoming cheaper and more reliable for mass applications.

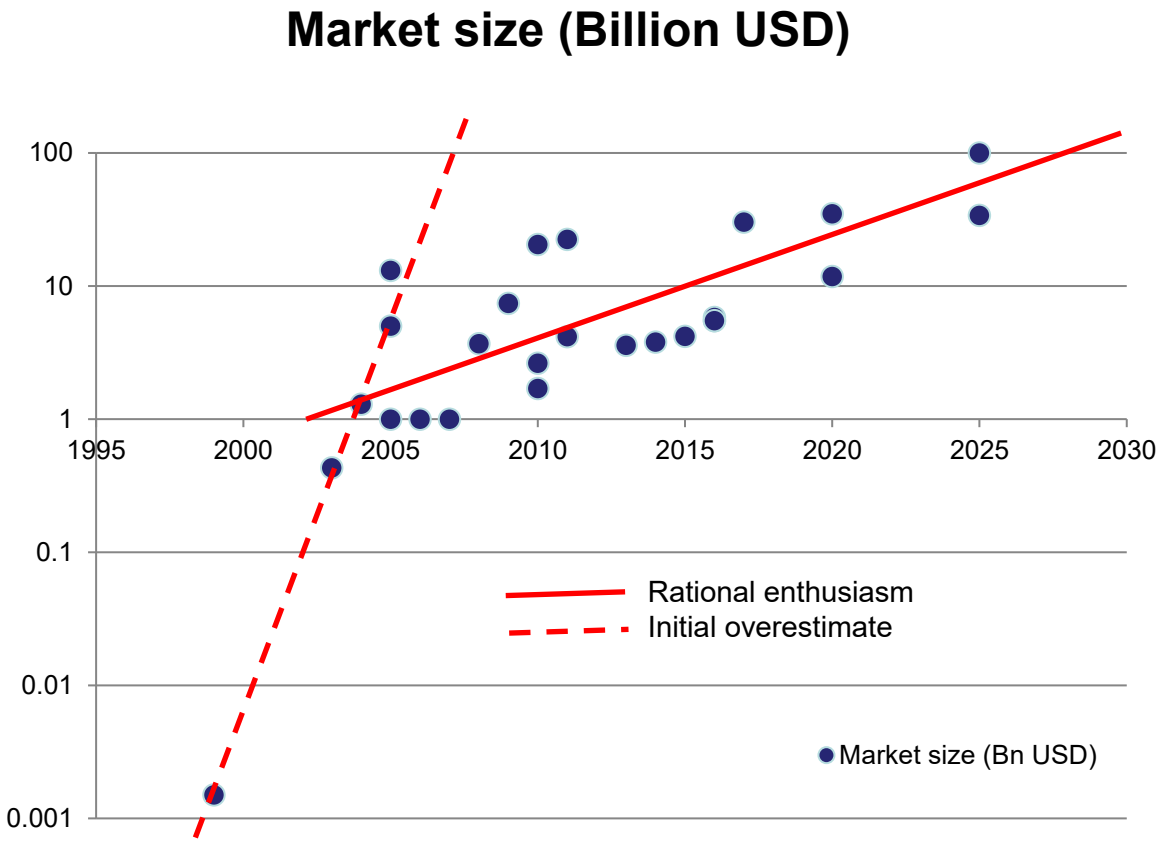
Continuous process is often preferred to batch-to-batch fabrication due to batch variations and the ease of fine-tuning QD size and other parameters.



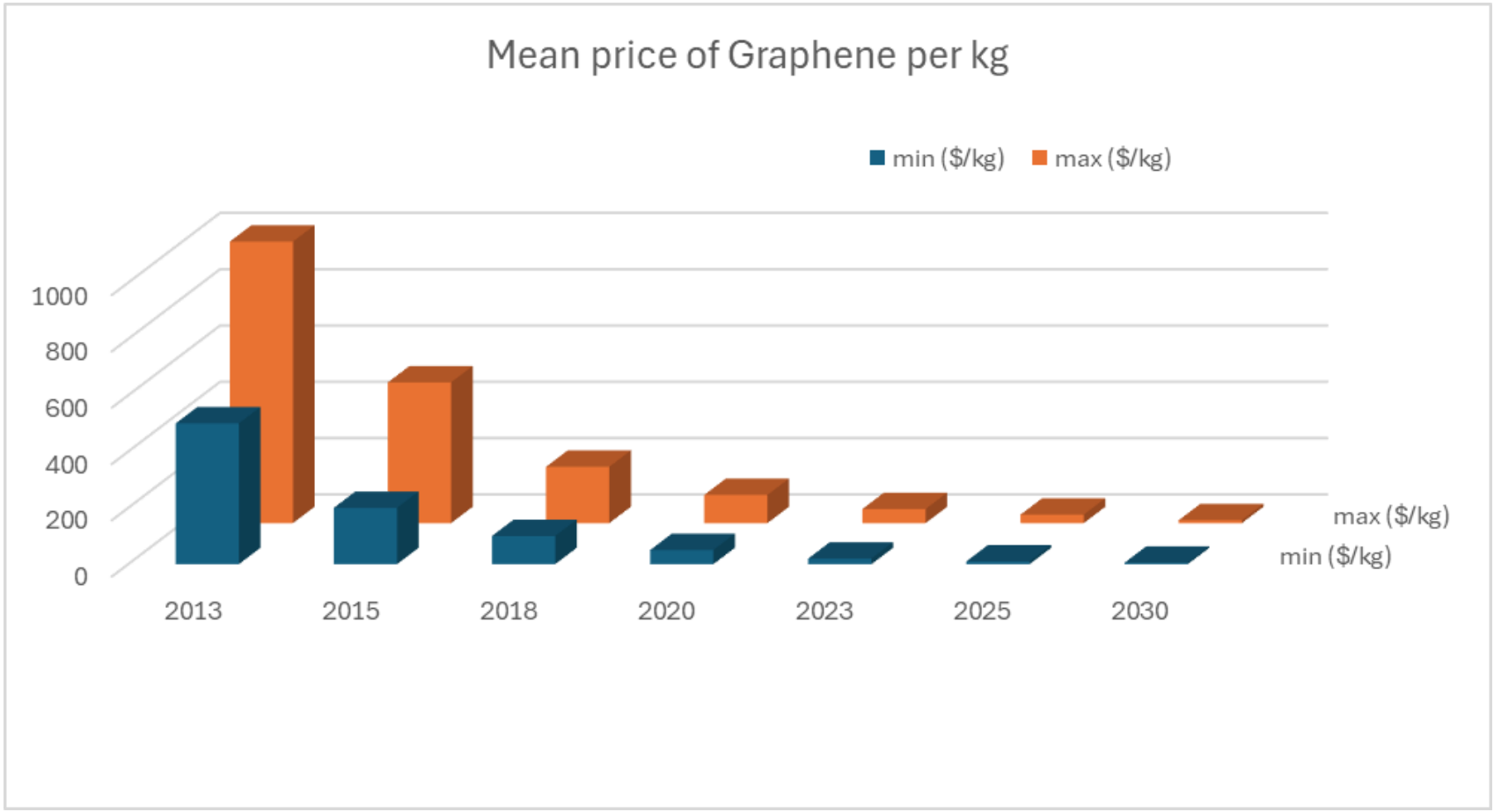


Nanomaterials (Manufactured)

- Since 2000s, the development of nanotechnology has led to an enormous investment in nanomaterials production.
- Academic and Industrial players enjoyed large scale investment.



Graphene price per kg



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Currently looking for part time interns for our remote teams. Ask me for more information.

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