2D Generation

Enabling the Future of Semiconductors

adisyn

AI1:ASX

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Disclaimer

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Who is Adisyn

Adisyn Ltd is publicly listed on the the Australian Securities Exchange (ASX) under the ticker AI1

Field of activity

1. Through 2D Generation (a fully owned subsidiary) – development of novel technologies and methods to produce high-quality graphene, in a low-temperature process, targeting semiconductors interconnect and other applications.
2. Original activity of building and deploying IT solutions, disaster recovery solutions, and end-to-end cyber security solutions.

Corporate Snapshot

- Share Price (A$): 0.05
- Market Cap (A$): 36M
- Enterprise Value (A$): 26.5M
- Cash (A$): 9.5M

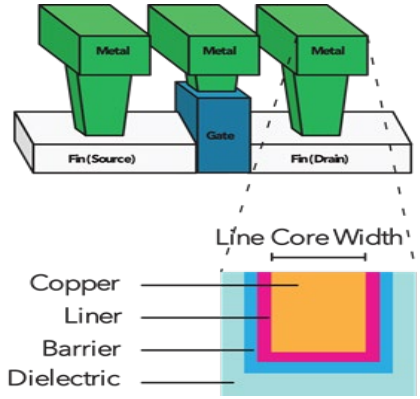
Board of Directors

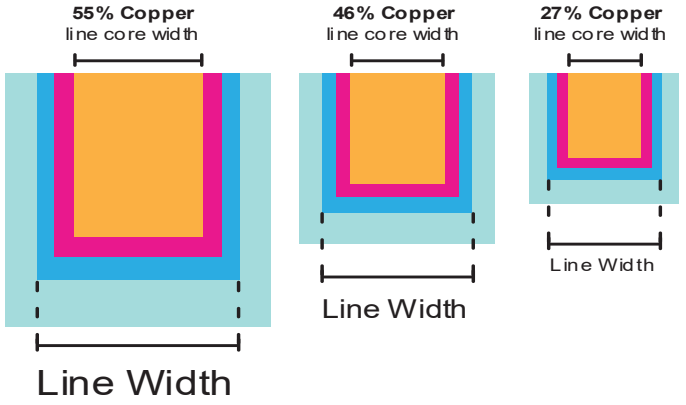
- Kevin Crofton – Chairman
- Arye Kohavi – Director, CEO of 2D Generation
- Dominic O'Hanlon – Non-Executive Director
- Blake Burton - Managing Director of Adisyn

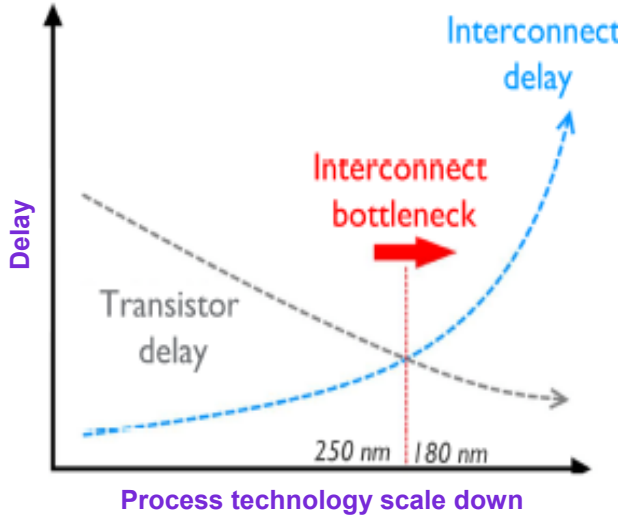
2D Generation

The Copper Interconnect Dilemma…

- Smaller and smaller design rules equals more transistors per chip – which means faster performance
- But the inherent resistance increases to the point that processing speed is ultimately limited by physics

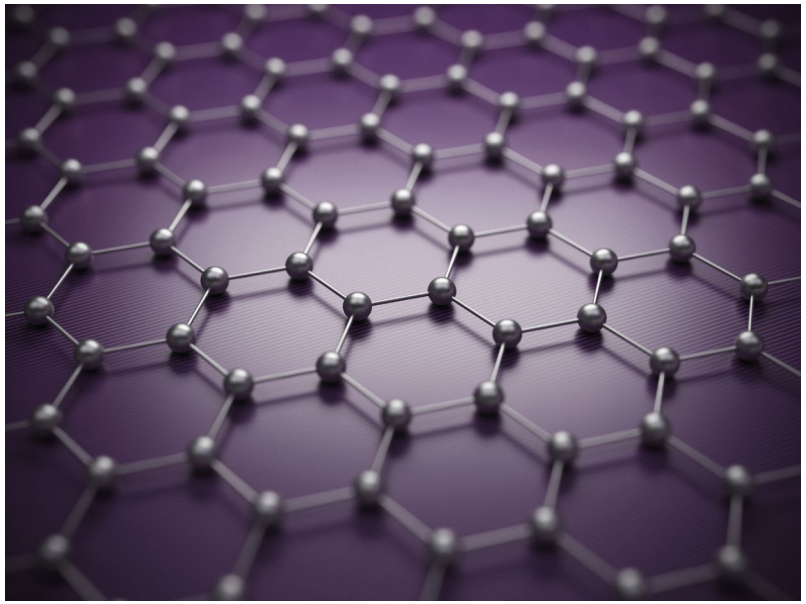






* Yosi Shacham-diamand, Tetsuya Osaka, Madhav Datta, and Takayuki Ohba. (Book) “Advanced Nanoscale ULSI Interconnects”. 2009.

Why Graphene



Graphene is a unique carbon structure. It consists of a single atom layer of carbon atoms arranged in a honeycomb lattice and is the world's first two-dimensional (2D) material. Graphene boasts exceptional properties, highly valuable to the semiconductor industry, including:

- ✓ **Superior Electrical Conductivity**: outperforms copper and other traditional materials - ideal for high-speed interconnects
- ✓ **Remarkable Thermal Conductivity**: dissipates heat more efficiently than any other known material, making it essential for managing heat in high-performance electronic devices.
- ✓ **Exceptional Strength and Flexibility**: stronger than steel and incredibly flexible, opening possibilities for new types of flexible electronics, wearable devices, and other innovative products.
- ✓ **High Transparency**: is nearly transparent, making it suitable for applications like displays, touchscreens, and solar cells.

The Challenge

- **For advanced process nodes, the Interconnect is a bottleneck:**
  - ❑ Limiting clock and data transfer rates
  - ❑ Consumes a lot of power
  - ❑ Major source of heat generation

- **Graphene based solutions for the interconnect are well defined, but no suitable industrial process has been identified yet**

- **From imec's paper* on Graphene for interconnects:**

  "While this study focuses on graphene transfer, a more 'elegant' way of depositing graphene would be direct growth on the metal template of interest. Growing high-quality graphene requires however high growth temperatures (900-1000°C) and can as such not be applied on interconnect-type of metals."

  *https://www.imec-int.com/en/articles/promise-hybrid-graphenemetal-structures-advanced-interconnects

2D Generation's Process

- ALD-based
- Unique and patented process
- Forming graphene directly on the wafer
- Use of patented precursors
- Low-temperature process
- Compatible with current manufacturing limitations
- Can be applied using existing industrial processes and equipment

Beneq ALD Machine

State-of-the-Art Atomic Layer Deposition

- Procured highly specialised Atomic Layer Deposition (ALD) machine from Beneq, allowing full process development
- ALD machines deposit extremely thin layers (down to the atomic layer) of material on to chips
- All advanced semiconductor fabs around the globe use ALD
- **Installation expected in May. The team is already in training at Beneq Finland.**

beneq.com

Imec Collaboration

Imec is the world's leading semiconductor industry R&D hub

- 5,000 researchers from more than 95 countries
- 2.5 billion Euro infrastructure, 300mm leading edge semiconductor pilot line
- 940M Euro in revenue, a public-private funded entity
- Partnered with the world's leading semiconductor designers, fabricators, and suppliers

2D Generation has a strategic cooperation agreement with imec to validate the company's technology:

1. Simulation to explore the benefits of the technology in a relevant context for product applications.
2. Physical tests of the graphene coating of several materials (metals and non-metals) and several usages (surfaces, structured wafers, and diffusion barrier).

ConnectingChips – EU Undertaking

Connecting Chips

Why is the Project significant?

- The Project is focused on developing and integrating electronic, photonic, power, and RF devices within System in Package (SiP) modules for applications in **data centres, high-performance computing, Artificial Intelligence, autonomous vehicles and digital industries.**
- The Project aims to improve heat dissipation, optimize data transmission, implement thermal control for dense SiP modules and advance integration enhance device performance and efficiency.

2DG's role in the Project

Leveraging graphene's exceptional properties through pioneering low-temperature ALD techniques, this technology improves semiconductor performance in interconnects, coatings, capping layers by addressing impedance, resistivity, and heat dissipation challenges.

What will it mean for 2DG to be part of the project?

- **The industry largest players validate 2DG's innovative approach and establishes its role in the semiconductor industry.**
- Provides a platform for collaboration and technological advancement.

NVIDIA, KLA, Unity SC, TNO, ThermoFisher Scientific, AT&S, Valeo, orbotech A KLA Company, NXP, Fraunhofer, Infineon, Technische Universität Braunschweig, FBH Ferdinand Braun Institut

Disclaimer: "ConnectingChips" hasn't been granted yet.

2DG Intellectual Property

Four patent families are directed to the technology of the Company and each patent is composed of our unique production methods and materials:

1. **GRAPHENE COATED NON-METALLIC SURFACES, DEVICES AND METHOD THEREOF –** directed to the technologies used for conductive diffusion barrier, and other applications
2. **GRAPHENE COATED METALLIC SURFACES, DEVICES AND METHOD OF MANUFACTURE THEREOF –** directed to the technologies used for conductive capping layer, and other applications
3. **METHOD OF MANUFACTURE OF GRAPHENE COATED SURFACES BY ATOMIC OR MOLECULAR LAYER DEPOSITION –** directed to graphene manufacture by ALD
4. **GRAPHENE METAL COMPOSITE** – directed to graphene layers interlayered with metal layers including coatings of patterned surfaces

Investment Highlights

Adisyn's wholly-owned subsidiary 2D Generation is developing graphene-based interconnects for the next-generation of semiconductors

Opportunity to transform a global market

Semiconductor sales are expected to almost double by 2030 to ~US$1Tn[1]

Major early-mover advantage

Substantial knowledge and intellectual property developed on graphene deposition over the past four years, offering a significant early-mover advantage

World-leading process

Unique, patented low-temperature processing method unmatched by any peer of whom the Company is aware, globally

Partnerships to drive development

Collaboration with the world's leading semiconductor research institute imec and selected for the EU's Connecting Chips Joint Undertaking potentially collaborating with NVIDIA, Valeo and Applied Materials

Landmark agreement augments core research

Partnership with Tel Aviv University Nano Center gives access to a second ALD machine to perform parallel development

Strong leadership

World-renowned semiconductor and technology leaders represented on the Board to drive success

[1] Kevin Zhang, TSMC, Semiconductor Industry: Present and Future, IEEE solid state Circuit Conference, Feb 2024

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Thank you

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