



ASX ANNOUNCEMENT

FOR IMMEDIATE RELEASE TO THE MARKET

PPK Group Limited – ASX Code: PPK

Tuesday 22 March 2022

Positive test results received for white graphene

PPK Group Limited (ASX Code: PPK) is pleased to announce that its subsidiary White Graphene Limited has received highly encouraging results from its 'polymer and resin coatings' research and development project.

White graphene is currently manufactured by White Graphene Limited at its plant in Geelong, Victoria.

The team has worked with the Institute of Frontier Materials (part of Deakin University) to research the effects of adding white graphene to a wide variety of polymer and resin coatings. The addition of relatively small amounts of white graphene (wt%) were found to significantly improve polymer coating mechanical performance in a number of areas, including water resistance / hydrophobic improvements, moisture impermeability, wear resistance and anti-bacterial properties.

These polymer enhancement and matrix reinforcement technologies further demonstrate the opportunity for significant and viable large scale industrial use of boron nitride nanomaterials in the manufacture of everyday products. White Graphene Limited is also currently undertaking further research to investigate the extent to which white graphene is impermeable to hydrogen, to improve the durability of hydrogen storage and transport systems.

Executive Chairman Robin Levison commented:

“These strong research and development results represent a fantastic outcome for the PPK Group. This technology has many applications in a variety of multi-billion dollar global markets, such as timber coatings and paints. That the inclusion of such small amounts of white graphene has led to such significant improvements really underlines the viability of everyday use in such products, particularly in light of the much lower cost of white graphene in comparison to BNNTs. The Board is very excited by these results and anticipates that it will strongly support our next phase of collaboration with key industry participants.”

A summary of the research and development results is set out in Exhibit 1 to this announcement.

This announcement has been made and authorised by the PPK Group Board.

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White Graphene in Polymer Coatings

Test Results

In this research, the effects of the addition of a derivative of boron nitride nanosheets or White Graphene on the properties of paints and other coatings were investigated. The paints and coatings involved were:

- Water-based acrylic timber coating
- Water-based polyurethane (PU) timber coating
- Oil-based polyurethane (PU) timber coating
- Water-based acrylic interior wall paint
- Epoxy flooring

According to the test results, significant improvements in the key properties of all the five paints/coatings could be achieved with the addition of less than 1wt.% White Graphene derivatives (see the tables for the results). These properties included water resistance, moisture impermeability, wear resistance, hardness, adhesion, and anti-bacteria. For example, the wear resistance of the epoxy flooring increased 52%; the moisture impermeability of the water-based PU timber coating enhanced 183%; the anti-bacteria of the interior wall paint improved 1700%.

These significant improvements are ascribed to the many extraordinary properties of White Graphene:

- ✓ 138 times stronger than 304 stainless steel but 4 times lighter
- ✓ 180° bending for millions of times without fracture
- ✓ Impermeable to the smallest molecule, *i.e.* hydrogen gas, even at one atom thickness
- ✓ Resistant to corrosion from acids/alkalines and salt water
- ✓ Huge surface area, *i.e.* just 15g can cover the Geelong GMHBA Stadium
- ✓ 99.7% transparent to visible light

- ✓ High thermal stability comparable to that of brass
- ✓ 2 times more thermally conductive than copper
- ✓ Radiation shielding

A/Prof. Luhua Li



Institute for Frontier Materials
Deakin University
11th March 2022

Prof. Matthew Barnett



Director
Institute for Frontier Materials
Deakin University
11th March 2022

1. Timber coating

The global market for timber coating was **US\$9.67 billion** in 2020 [1]

Key properties of a timber coating:

- Water resistance
- Wear resistance
- Hardness
- Adhesion

[1] Wood Coating Market - Global Outlook & Forecast 2021-2026.

Water-based acrylic



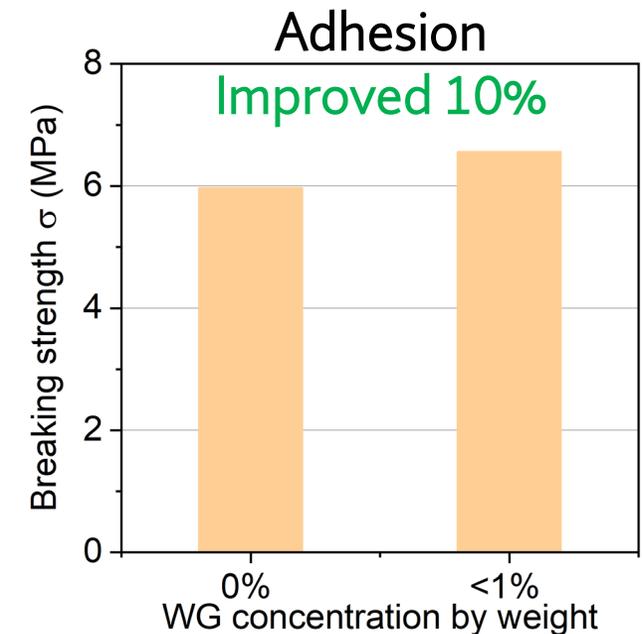
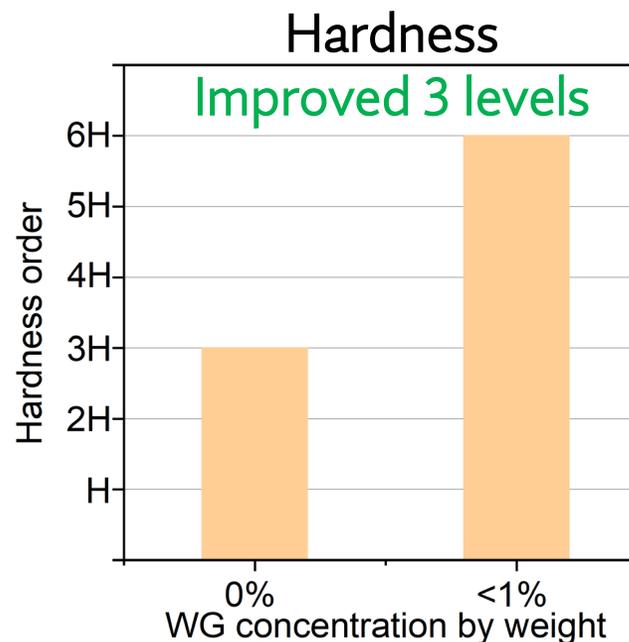
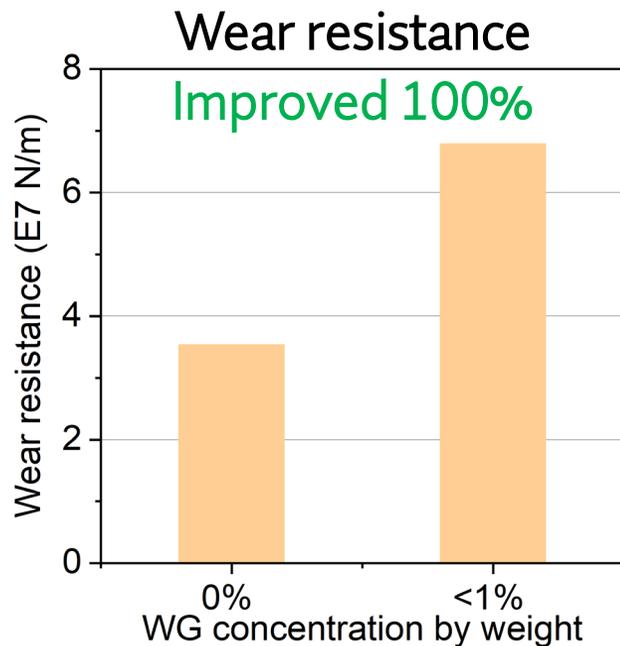
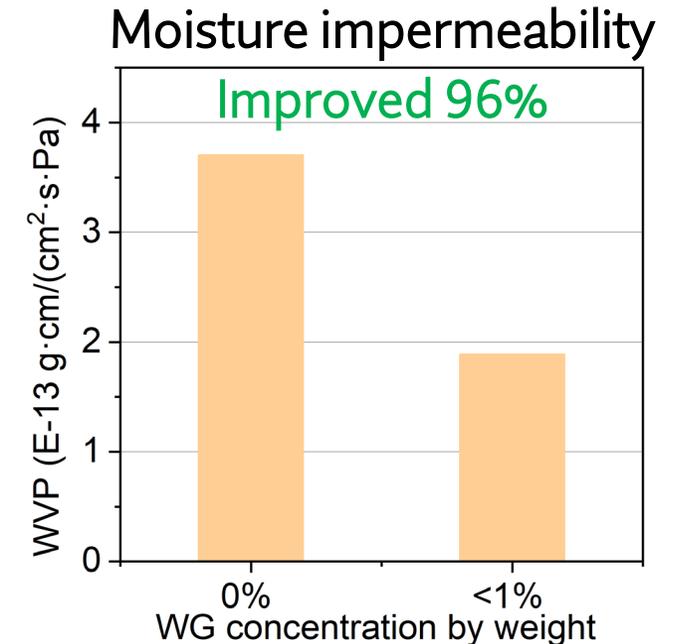
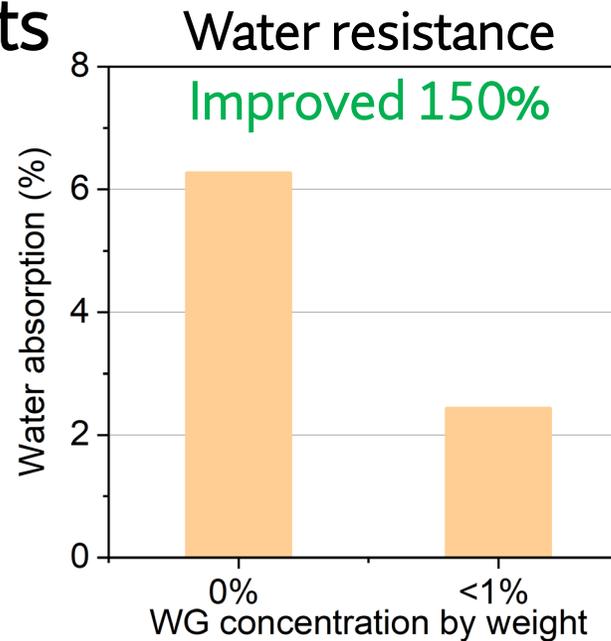
Water-based PU



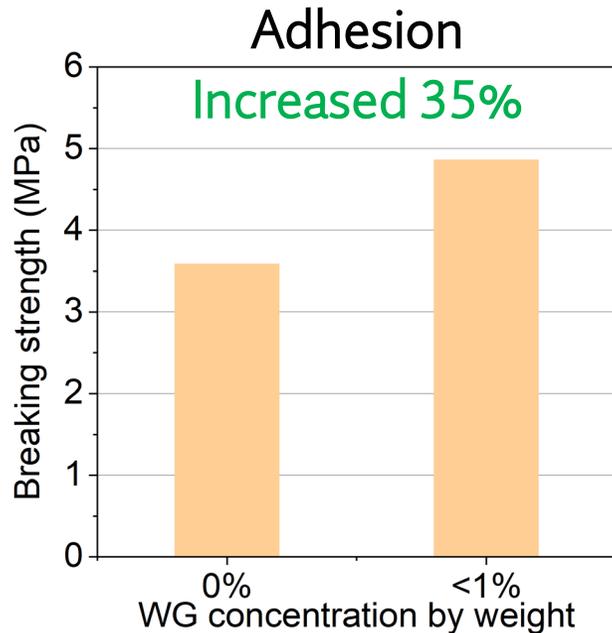
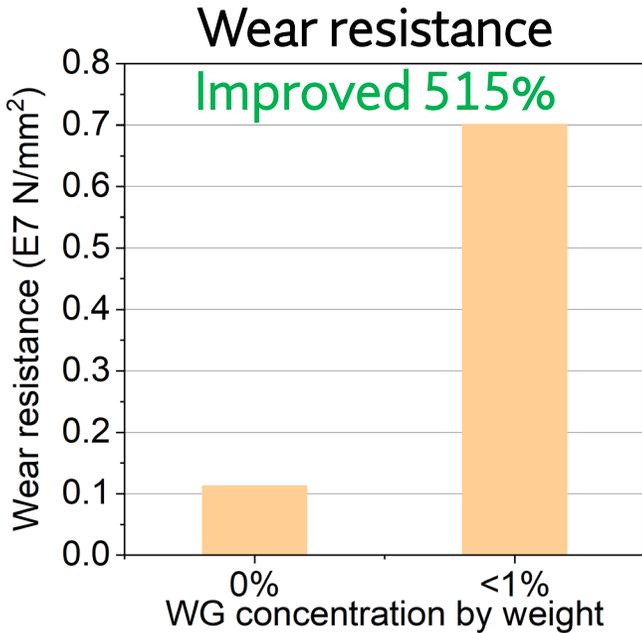
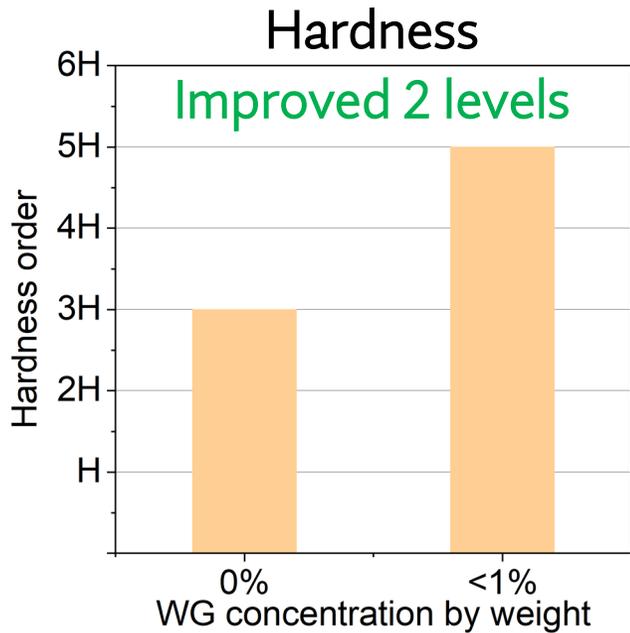
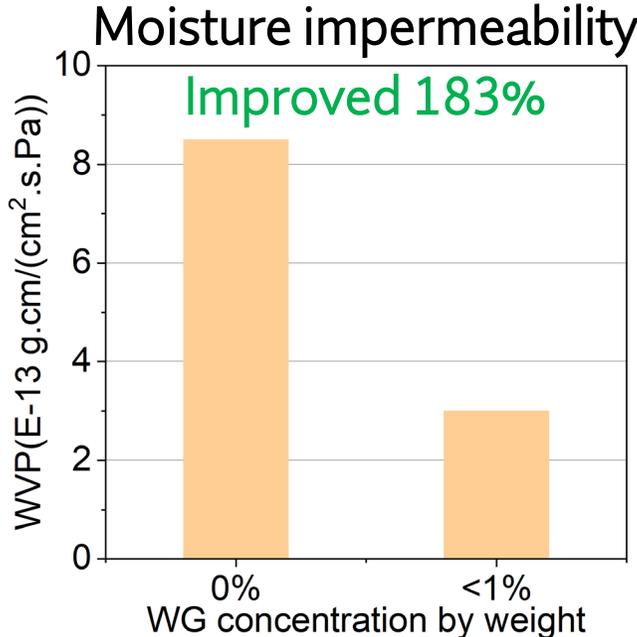
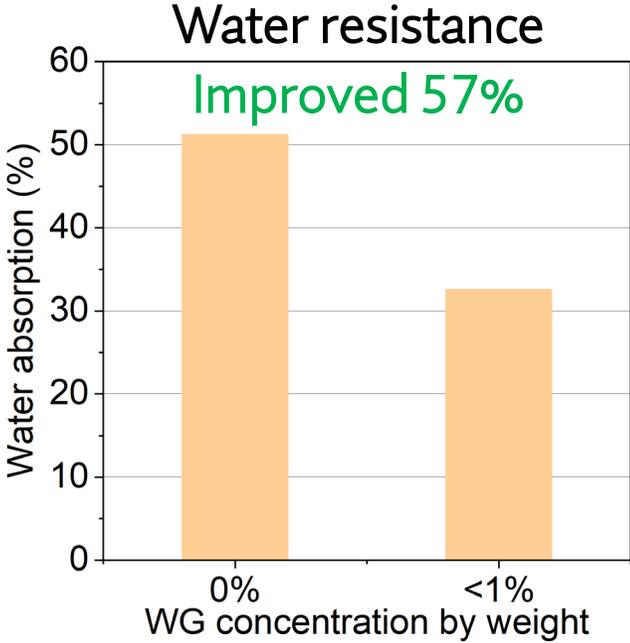
Oil-based PU



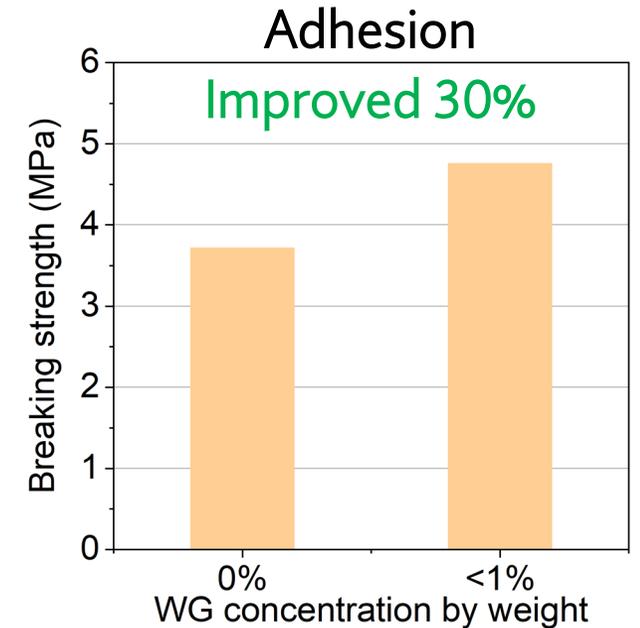
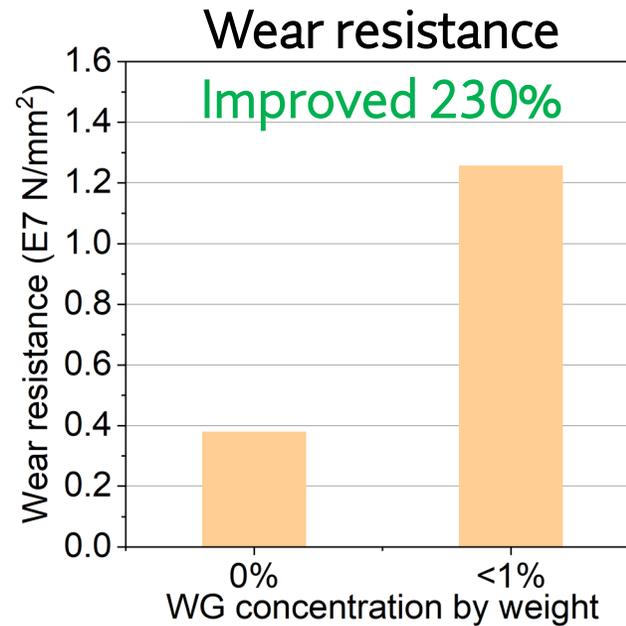
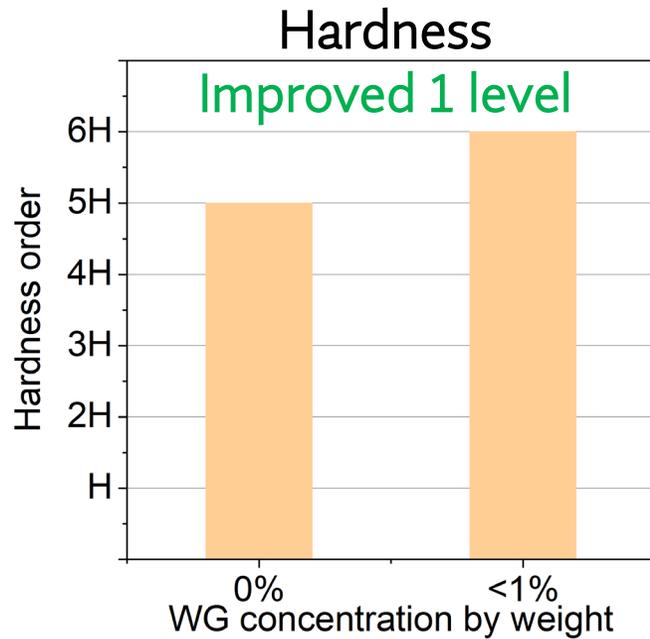
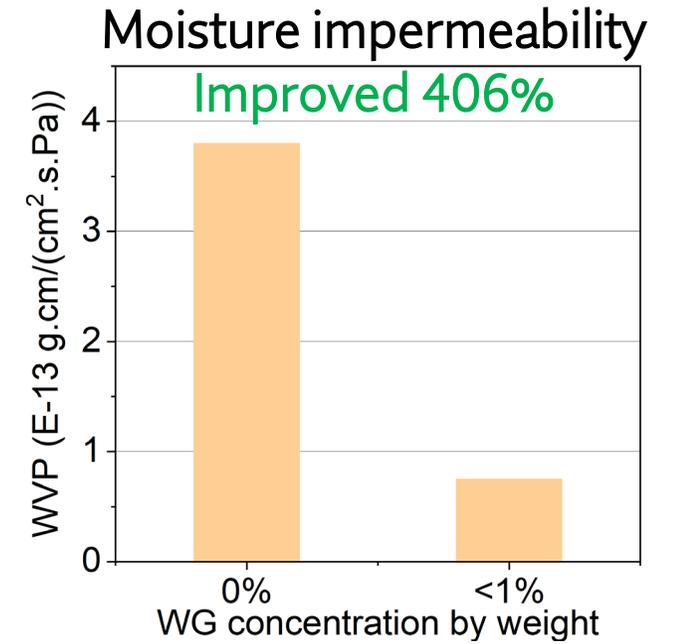
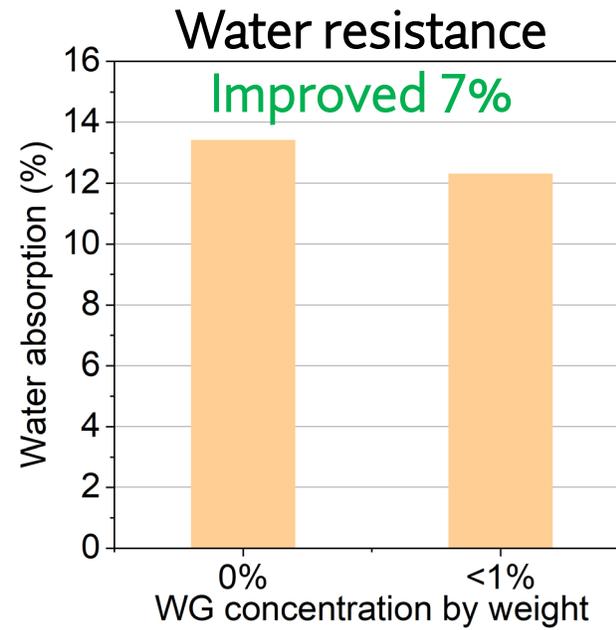
1.1 Water-based acrylic results



1.2 Water-based PU results



1.3 Oil-based PU results



2. Interior wall paint

The global market for interior architectural coatings was **US\$39.8 billion** in 2018 and will grow to **US\$57.6 billion** by 2026 [2].

Key properties of interior wall paint:

- Water resistance
- Wear resistance
- Hardness
- Stain resistance
- Anti-bacteria

Water-based acrylic

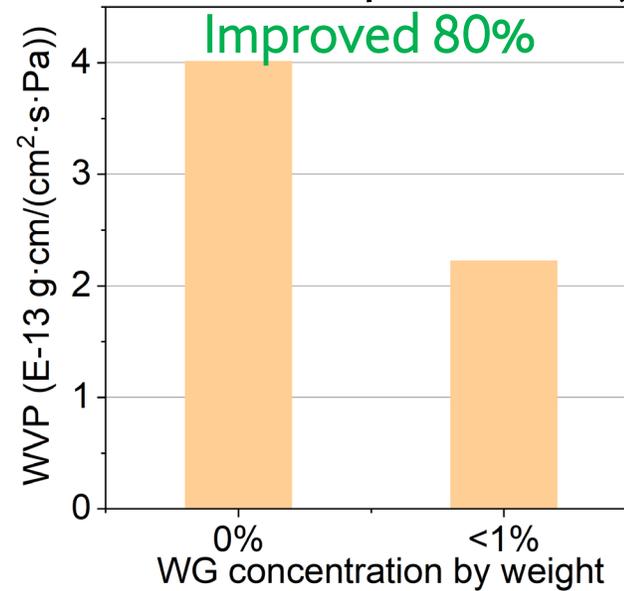


[2] Interior Architectural Coatings Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2019-2024.

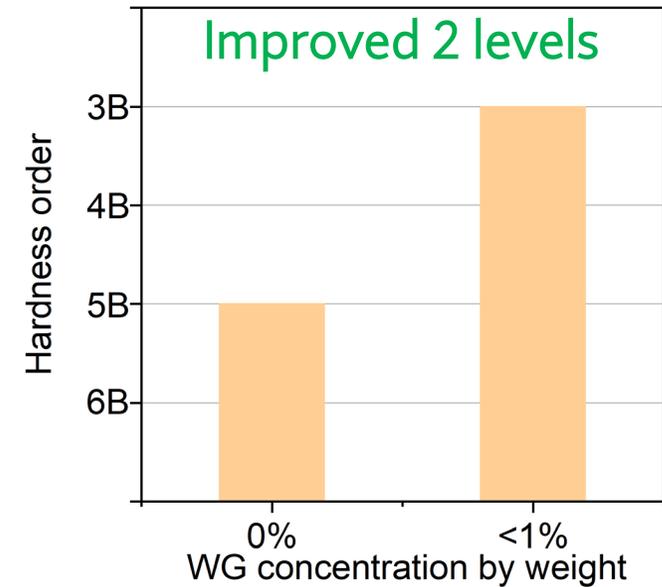
2.1 Water-based acrylic results



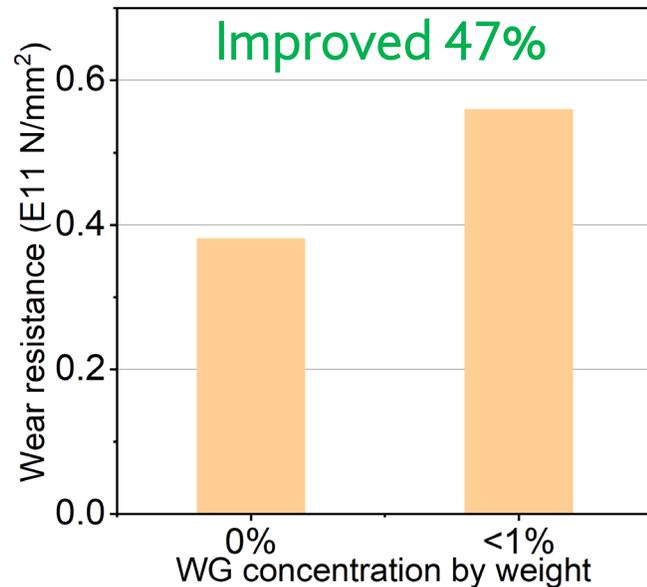
Moisture impermeability



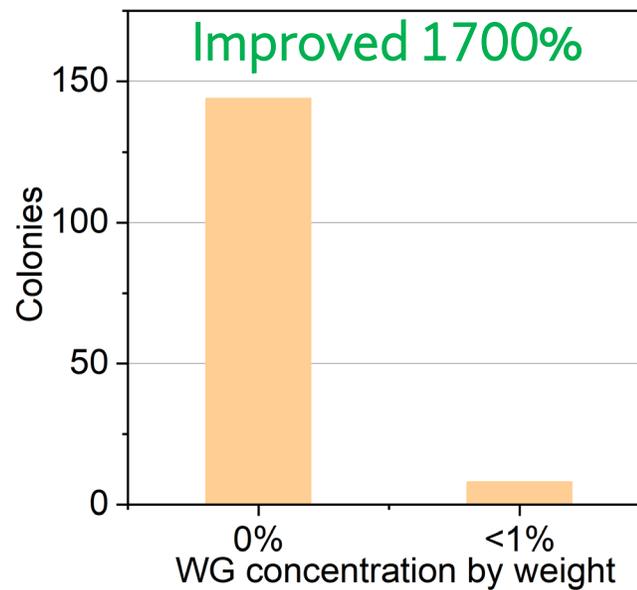
Hardness



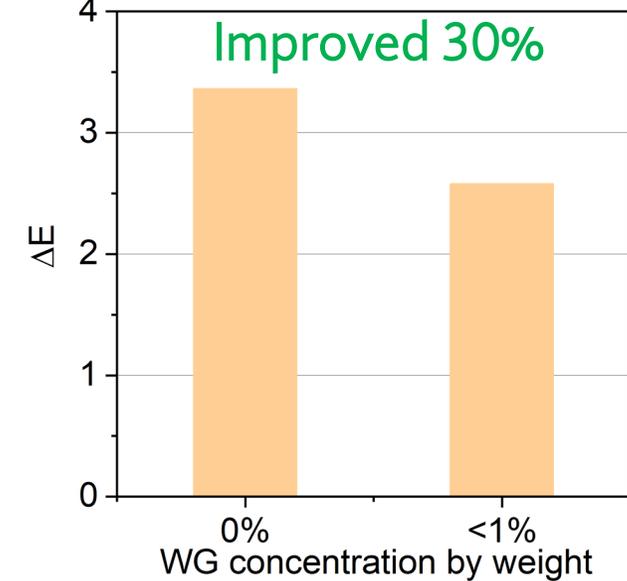
Wear resistance



Anti-bacteria



Stain resistance



3. Epoxy flooring

The market for floor coating was **US\$5.5 billion** in 2019 and will grow to **US\$6.8 billion** by 2024 [3].

Key properties of epoxy flooring:

- Wear resistance
- Hardness
- Contact angle
- Friction coefficient (wet)



[3] Industrial Floor Coating Market by Resin Type, Flooring Material, Coating Component, Technology, End-use Sector, Region - Global Forecast to 2024.

3.1 Epoxy Flooring results

