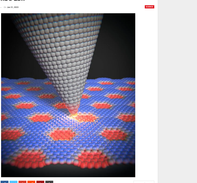
QUICK TELEGRAM
Expert News First

Graphene On Platinum Surfaces Seemingly Defies Coulomb's Law

David Morgan — Jan 28, 2021

Share
Share
27
1



Tribotronic Dirac fermion behavior. Top: Left, an electric field is transmitted into the Mott superconductor (depicted as the upward arrow) after the top-gate is biased (depicted as the curved, dashed line). Right, a schematic of a Mott insulator (Credit: Nature Physics, doi:10.1038/s41567-020-01087-7)

Researchers from Brown and Tel Aviv discovered that friction varies with speed in specific graphene structures on platinum surfaces, defying Coulomb's law which states that friction is speed-independent in the macro world.

Materials made of single atomic layers are highly valued for their friction qualities, useful in reducing friction in hard disks or moving parts of nanobots or space telescopes. Graphene, consisting of a single layer of carbon atoms arranged like a honeycomb, is a prime example and is under examination for its potential as a lubricating layer. Earlier studies showed that a graphene ribbon can glide almost friction-free across a gold surface.

Surprising results with a rough surface

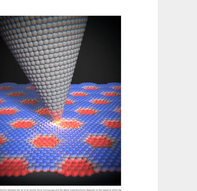
If graphene is applied to a platinum surface, it has a significant impact on the measurable friction forces. Now, physicists from the University of Bristol and Tel Aviv University have reported in the journal Nature Letters that, in this instance, the friction depends on the speed at which the tip of an atomic force microscope (AFM) was built to a moved across the surface. This finding is surprising because friction does not depend on speed according to Coulomb's law, which applies in the macro world.

In comparison with the platinum substrate, graphene no longer forms only the hexagonal honeycomb pattern of carbon atoms but also forms a rectangular honeycomb lattice on Bristol superstructure. The surface is then no longer completely flat and exhibits a certain degree of roughness.

"If we move the AFM tip across this slightly corrugated surface at low speed, we measure a weak and almost constant frictional force," explains Professor Ernst Meyer from the Swiss Nanoscience Institute and the Department of Physics at Basel University. "Above a certain threshold, however, the friction that increases with the speed of the AFM tip," adds first author Dr. Yiming Dong. "The larger the Mott superconductors, the lower the threshold at which the friction becomes speed-dependent."

The researchers found that there is greater resistance at the ridges of the Mott superconductors during the movement of the tip. These ridges undergo elastic deformation due to the pushing tip before sliding against them when the pressure is sufficiently high. This effect results in greater frictional forces that increase with the speed of the tip. Simulations and an analytical model confirm the experimental findings obtained by this international team of researchers.

Reference: "Velocity Dependence of Bristol Friction" by Yiming Dong, Xiang Gao, Antoine Hinaut, Sebastian Scheib, Shuyu Huang, Thilo Glatzel, Oded Hod, Michael Urbakh and Ernst Meyer, 28 November 2020, Nano Letters.
DOI: 10.1021/acs.nanolett.0c03667



Tribotronic Dirac fermion behavior. Top: Left, an electric field is transmitted into the Mott superconductor (depicted as the upward arrow) after the top-gate is biased (depicted as the curved, dashed line). Right, a schematic of a Mott insulator (Credit: Nature Physics, doi:10.1038/s41567-020-01087-7)

Researchers from Brown and Tel Aviv discovered that friction varies with speed in specific graphene structures on platinum surfaces, defying Coulomb's law which states that friction is speed-independent in the macro world.

Materials made of single atomic layers are highly valued for their friction qualities, useful in reducing friction in hard disks or moving parts of nanobots or space telescopes. Graphene, consisting of a single layer of carbon atoms arranged like a honeycomb, is a prime example and is under examination for its potential as a lubricating layer. Earlier studies showed that a graphene ribbon can glide almost friction-free across a gold surface.

Surprising results with a rough surface

If graphene is applied to a platinum surface, it has a significant impact on the measurable friction forces. Now, physicists from the University of Bristol and Tel Aviv University have reported in the journal Nature Letters that, in this instance, the friction depends on the speed at which the tip of an atomic force microscope (AFM) was built to a moved across the surface. This finding is surprising because friction does not depend on speed according to Coulomb's law, which applies in the macro world.

In comparison with the platinum substrate, graphene no longer forms only the hexagonal honeycomb pattern of carbon atoms but also forms a rectangular honeycomb lattice on Bristol superstructure. The surface is then no longer completely flat and exhibits a certain degree of roughness.

"If we move the AFM tip across this slightly corrugated surface at low speed, we measure a weak and almost constant frictional force," explains Professor Ernst Meyer from the Swiss Nanoscience Institute and the Department of Physics at Basel University. "Above a certain threshold, however, the friction that increases with the speed of the AFM tip," adds first author Dr. Yiming Dong. "The larger the Mott superconductors, the lower the threshold at which the friction becomes speed-dependent."

The researchers found that there is greater resistance at the ridges of the Mott superconductors during the movement of the tip. These ridges undergo elastic deformation due to the pushing tip before sliding against them when the pressure is sufficiently high. This effect results in greater frictional forces that increase with the speed of the tip. Simulations and an analytical model confirm the experimental findings obtained by this international team of researchers.

Reference: "Velocity Dependence of Bristol Friction" by Yiming Dong, Xiang Gao, Antoine Hinaut, Sebastian Scheib, Shuyu Huang, Thilo Glatzel, Oded Hod, Michael Urbakh and Ernst Meyer, 28 November 2020, Nano Letters.
DOI: 10.1021/acs.nanolett.0c03667

Copyright (c) Quick Telegram

Read original article here

Denial of responsibility! Quick Telegram is an automatic aggregator of the all world's media. In each content, the hyperlink to the primary source is specified. All trademarks belong to their rightful owners, all materials to their authors. If you are the owner of the content and do not want us to publish your materials, please contact us by email – info@quickteleram.com. The content will be deleted within 24 hours.

Share
Share
27
1

David Morgan

PREV POST
"Nature Cancer" allegedly continues after 15 mysterious backdoorings in SUNB
NEXT POST
Southern California drivers endure short roads due to recent snow storm

Leave a comment

Heritage And Culture Key For Thai Confectioners To Compete With Western Brands

Local Brands — Jan 28, 2021

Share
Share
1
1

Credit: Unsplash/CC0 Public Domain

Traditional confectionery in Thailand is getting crowded out of the market by major western brands, but a new study suggests local manufacturers can fight back by using their country's local heritage and culture to gain competitive advantage.

"Food is an important part of any country's culture, identity and economy," explained Dr. Hindle Du, Principal Academic in Marketing at Bournemouth University, who led the study. "However, in recent years we have seen people in Asian countries increasingly drawn to western foods which are overpowering the local markets."

"It is not just happening in the confectionery market. Big budget marketing campaigns by major corporations for breakfast cereals has led to a decline in the traditional Thai breakfast experience," she continued.

For this new study, Dr. Du and her team carried out in-depth interviews with consumers and retail managers in Thailand. She then designed survey which was completed by around 400 people, asking about their attitude towards western and local products, and the factors that influence their purchasing decisions.

The results have been published in the journal Sustainability.

"We found that the current appearances of big city stores and restaurants that sell western foods are very well suited to today's Instagram and TikTok culture," said Dr. Du. "This makes them extremely appealing to Thai youngsters who like to share images of their food and stories of their evenings out."

By contrast, local products in Thailand are mostly made by small family businesses and sold in more modest settings, such as on street markets, without eye-catching packaging and logos.

Despite these challenges, Dr. Du's study found that youngsters in Thailand do still enjoy local confectionery as well as the western brands and that local products have strong emotional value to them. "Young Thais are proud of their traditions and history, and that applies to their traditional foods too," Dr. Du explained.

The research team point out that by listening to the voices of youngsters about what they want, there is a strong opportunity for small, traditional confectionery businesses to gain competitive advantage and fight back against the major players in the market.

"They really have to think about what they have and how they can make the most of it," said Dr. Du. "They don't need to make major changes to their business models but small innovations to combine tradition and modernity can make a difference. We have found that the unique identity and culture of Thailand is often taken for granted by local businesses when they should be using this as their strength."

Dr. Du and her team then ran recommendations to approaches to revive traditional confectionery products in the SE which have been very successful. Nostalgic sweet shops are very common on high streets, alongside the bigger retailers. Likewise, independent tea shops selling cakes and cream teas are very popular with locals and overseas tourists, co-existing with the big coffee shop franchises.

The new study found that when people in Thailand decide to purchase a certain product, they are very likely to go ahead with the purchase and not change their mind. And each of such decisions is made in the communities too. Local producers can see these findings, and the loyalty to their national culture to build and maintain a loyal following for their products.

The one example of changes traditional sellers can consider, we found that youngsters associate western foods with social settings / groups of friends sitting and chatting in coffee shops. However, when it comes to local confectionery, they tend to simply purchase and take away.

The cities and towns with character, a cute store selling traditional sweets and cakes is an asset to the community. A space where local residents and tourists can gather and enjoy the same sweets. With such potential, there are many ways to revive and develop traditional sweets. Dr. Du concluded.

The research team hopes to expand their research to cover a wider variety of different markets. In the meantime, they hope that the findings of this study will lead to the development of marketing strategies to ensure the sustainability of traditional confectionery in the Thai sweets market.

More information:
Hindle Du et al, Personal and Emotional Values Embedded in Thai Consumers' Perceptions: Key Factors for the Sustainability of Traditional Confectionery Businesses, Sustainability (2021). DOI: 10.3390/su13021048

Provided by
Bournemouth University

Citation:
Heritage and culture key for Thai confectioners to compete with western brands (2021, January 31) retrieved 31 January 2021
from https://phys.org/news/2021-01-heritage-culture-key-thai-confectioners.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no
part may be reproduced without the written permission. The content is provided for information purposes only.

Thailand

Credit: Unsplash/CC0 Public Domain

Traditional confectionery in Thailand is getting crowded out of the market by major western brands, but a new study suggests local manufacturers can fight back by using their country's local heritage and culture to gain competitive advantage.

"Food is an important part of any country's culture, identity and economy," explained Dr. Hindle Du, Principal Academic in Marketing at Bournemouth University, who led the study. "However, in recent years we have seen people in Asian countries increasingly drawn to western foods which are overpowering the local markets."

"It is not just happening in the confectionery market. Big budget marketing campaigns by major corporations for breakfast cereals has led to a decline in the traditional Thai breakfast experience," she continued.

For this new study, Dr. Du and her team carried out in-depth interviews with consumers and retail managers in Thailand. She then designed survey which was completed by around 400 people, asking about their attitude towards western and local products, and the factors that influence their purchasing decisions.

The results have been published in the journal Sustainability.

"We found that the current appearances of big city stores and restaurants that sell western foods are very well suited to today's Instagram and TikTok culture," said Dr. Du. "This makes them extremely appealing to Thai youngsters who like to share images of their food and stories of their evenings out."

By contrast, local products in Thailand are mostly made by small family businesses and sold in more modest settings, such as on street markets, without eye-catching packaging and logos.

Despite these challenges, Dr. Du's study found that youngsters in Thailand do still enjoy local confectionery as well as the western brands and that local products have strong emotional value to them. "Young Thais are proud of their traditions and history, and that applies to their traditional foods too," Dr. Du explained.

The research team point out that by listening to the voices of youngsters about what they want, there is a strong opportunity for small, traditional confectionery businesses to gain competitive advantage and fight back against the major players in the market.

"They really have to think about what they have and how they can make the most of it," said Dr. Du. "They don't need to make major changes to their business models but small innovations to combine tradition and modernity can make a difference. We have found that the unique identity and culture of Thailand is often taken for granted by local businesses when they should be using this as their strength."

Dr. Du and her team then ran recommendations to approaches to revive traditional confectionery products in the SE which have been very successful. Nostalgic sweet shops are very common on high streets, alongside the bigger retailers. Likewise, independent tea shops selling cakes and cream teas are very popular with locals and overseas tourists, co-existing with the big coffee shop franchises.

The new study found that when people in Thailand decide to purchase a certain product, they are very likely to go ahead with the purchase and not change their mind. And each of such decisions is made in the communities too. Local producers can see these findings, and the loyalty to their national culture to build and maintain a loyal following for their products.

The one example of changes traditional sellers can consider, we found that youngsters associate western foods with social settings / groups of friends sitting and chatting in coffee shops. However, when it comes to local confectionery, they tend to simply purchase and take away.

The cities and towns with character, a cute store selling traditional sweets and cakes is an asset to the community. A space where local residents and tourists can gather and enjoy the same sweets. With such potential, there are many ways to revive and develop traditional sweets. Dr. Du concluded.

The research team hopes to expand their research to cover a wider variety of different markets. In the meantime, they hope that the findings of this study will lead to the development of marketing strategies to ensure the sustainability of traditional confectionery in the Thai sweets market.

More information:
Hindle Du et al, Personal and Emotional Values Embedded in Thai Consumers' Perceptions: Key Factors for the Sustainability of Traditional Confectionery Businesses, Sustainability (2021). DOI: 10.3390/su13021048

Provided by
Bournemouth University

Citation:
Heritage and culture key for Thai confectioners to compete with western brands (2021, January 31) retrieved 31 January 2021
from https://phys.org/news/2021-01-heritage-culture-key-thai-confectioners.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no
part may be reproduced without the written permission. The content is provided for information purposes only.

Copyright (c) Quick Telegram

Read original article here

Denial of responsibility! Quick Telegram is an automatic aggregator of the all world's media. In each content, the hyperlink to the primary source is specified. All trademarks belong to their rightful owners, all materials to their authors. If you are the owner of the content and do not want us to publish your materials, please contact us by email – info@quickteleram.com. The content will be deleted within 24 hours.

Share
Share
27
1

David Morgan

PREV POST
"Nature Cancer" allegedly continues after 15 mysterious backdoorings in SUNB
NEXT POST
Southern California drivers endure short roads due to recent snow storm

Leave a comment

TRENDING NOW

Just 14 MEPs Left In Trump's Corner, Pence Says

Sea Gap Plans Set Remarks Alone Big Bets Left Under

Hackers Attack Microsoft Exchange Servers In Hundreds

South Korea Lapse Jails Whistle-Blower Lawyer Who Lost

Tokyo, The Biggest With Number Who Have Left Area Under

David Morgan - 19478 Posts - 0 Comments

Leave a comment

© 2023 - Quick Telecast. All Rights Reserved.