# Performance Analysis of Field-Effect Transistors Based on Monolayer $WS_2$ Fabricated with Gold-Assisted Exfoliation

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Gold-assisted exfoliation is one of the ways to efficiently produce monolayers of transition metal dichalcogenides [1][2] on a silicon substrate or different 2D materials. Due to its repeatability and the large area of the obtained materials, this method is ideal for prototyping exotic layer configurations in van der Waals heterostructures, which cannot be maintained using growth methods like CVD or epitaxy that are difficult to optimize for specific layer stacking. So far, several studies that have examined gold-exfoliated materials have focused mainly on their structural properties, such as strain and doping [1][2], with little attention paid to the potential application of the exfoliated layers.
Our study focuses on using monolayers obtained with gold-assisted exfoliation to produce field-effect transistors. We systematically studied the electrical properties of over 80 $WS_2$ devices. Different lengths of the transistor channel were fabricated (Fig. 1) in order to use the transfer length method, which allowed us to study the properties of both the material (sheet resistance, mobility) and the metal-semiconductor junction (contact resistance). Our research has also been extended to review the quality of gold-exfoliated $MoS_2$ monolayers and the effect of $MoS_2$/$WS_2$/Gold heterostructures on contact resistance in the fabricated devices.

## References

[1] Fang Liu et al., Science, 367 (2020) 903-906
[2] S. E. Panasci et al., ACS Appl. Mater. Interfaces, 13 (2021) 31248–31259

## Figures

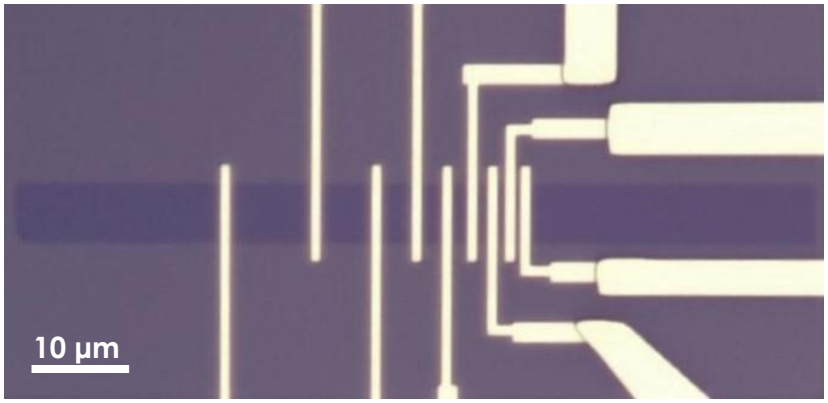


**Figure 1:** $WS_2$ transfer length method structure.