Conceptual design of plasmon-generated programable logic circuit

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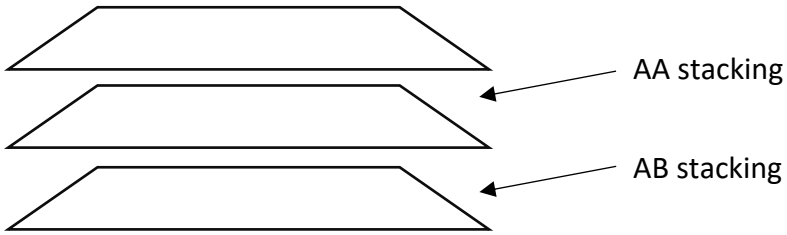
1. Components

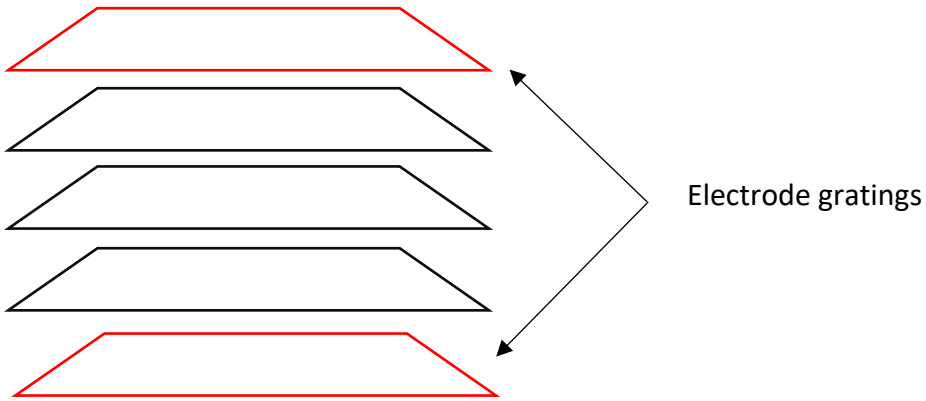
1) Three graphene sheets
2) Two electrode grating sheets
3) Electrode controller
4) THz signal receiver
5) THz signal transmitter

2. Assembly process

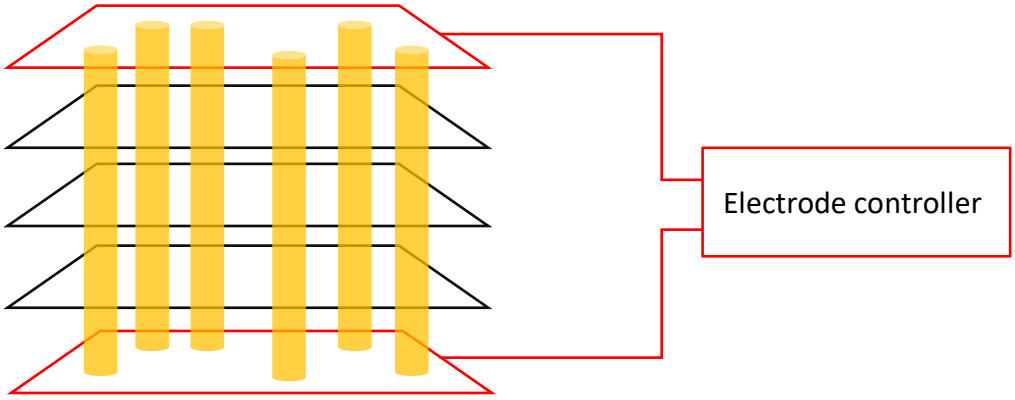
1) Constructing trilaminar graphene with both AA and AB stackings



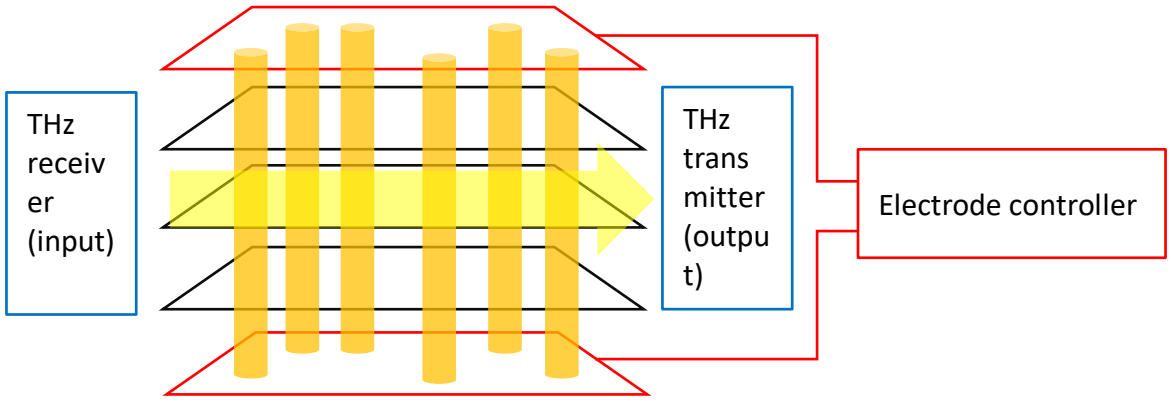
2) Sandwiching graphene sheets between two electrode grating sheets



3) Connecting the electrode controller with the electrodes. This allows us to precisely control the charging patterns on the graphene sheets. This would enable us to generate various logic patterns on trilaminar graphene by adjusting the dot mapping of the electric charges. By combining AA and AB stacking in trilaminar graphene, we would be able to create AND, OR and NOT logics using plasmons generated by the electrode.



4) Connecting the THz receiver and transmitter to enable transmission of optical digital data, thereby bypassing traditional electrical wire-based data transfer methods. The THz receiver functions as an input module, converting incoming optical signals into plasmons. Meanwhile, the THz transmitter serves as an output module, emitting plasmons in accordance with the processed digital data.



3. Discussion

1) Using THz technology, we could expect to generate plasmons at frequency exceeding 10 GHz, while simultaneously reducing overall power consumption compared to traditional electronic circuits.
2) With the ability to feedback output to input and dynamically change logic patterns, we could shrink the die size down to that of a programmable chip.
3) All components utilized in this system were designed so simple, making it relatively straightforward to manufacture them at the nanoscale level.
4) The exact mechanism by which logic can be produced using this component design remains to be studied, and will require further investigation.

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