Quality Dependence of Bi-layer Graphene on Heating Profile in the Rapid Thermal Processing Method

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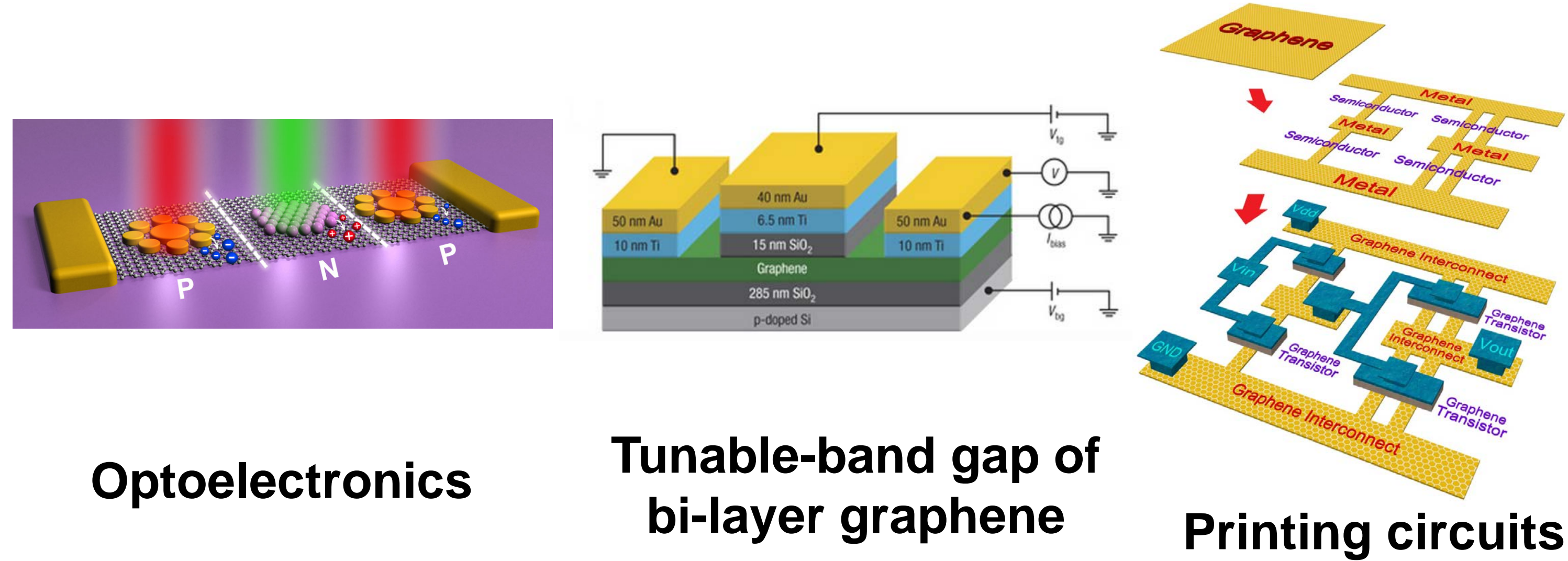Department of Electrical Engineering, University of Nebraska-Lincoln, Lincoln, NE 68588

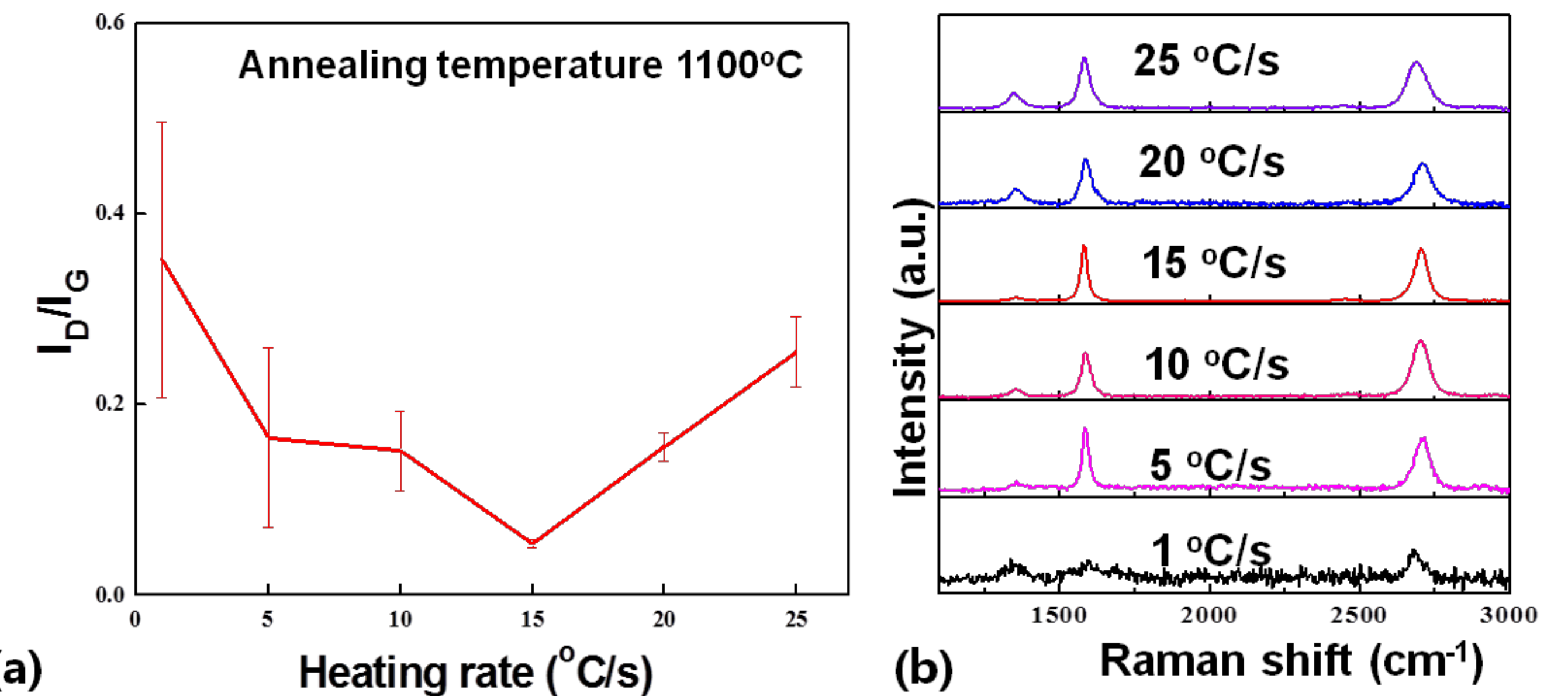E-mail: *ylu2@unl.edu*   Website: *http://lane.unl.edu*

University of Nebraska-Lincoln

Laser Assisted Nano-Engineering Lab

Motivations

Optoelectronics

Tunable-band gap of bi-layer graphene

Printing circuits

Experimental

Rapid thermal annealing

Key factors in the rapid thermal annealing process:
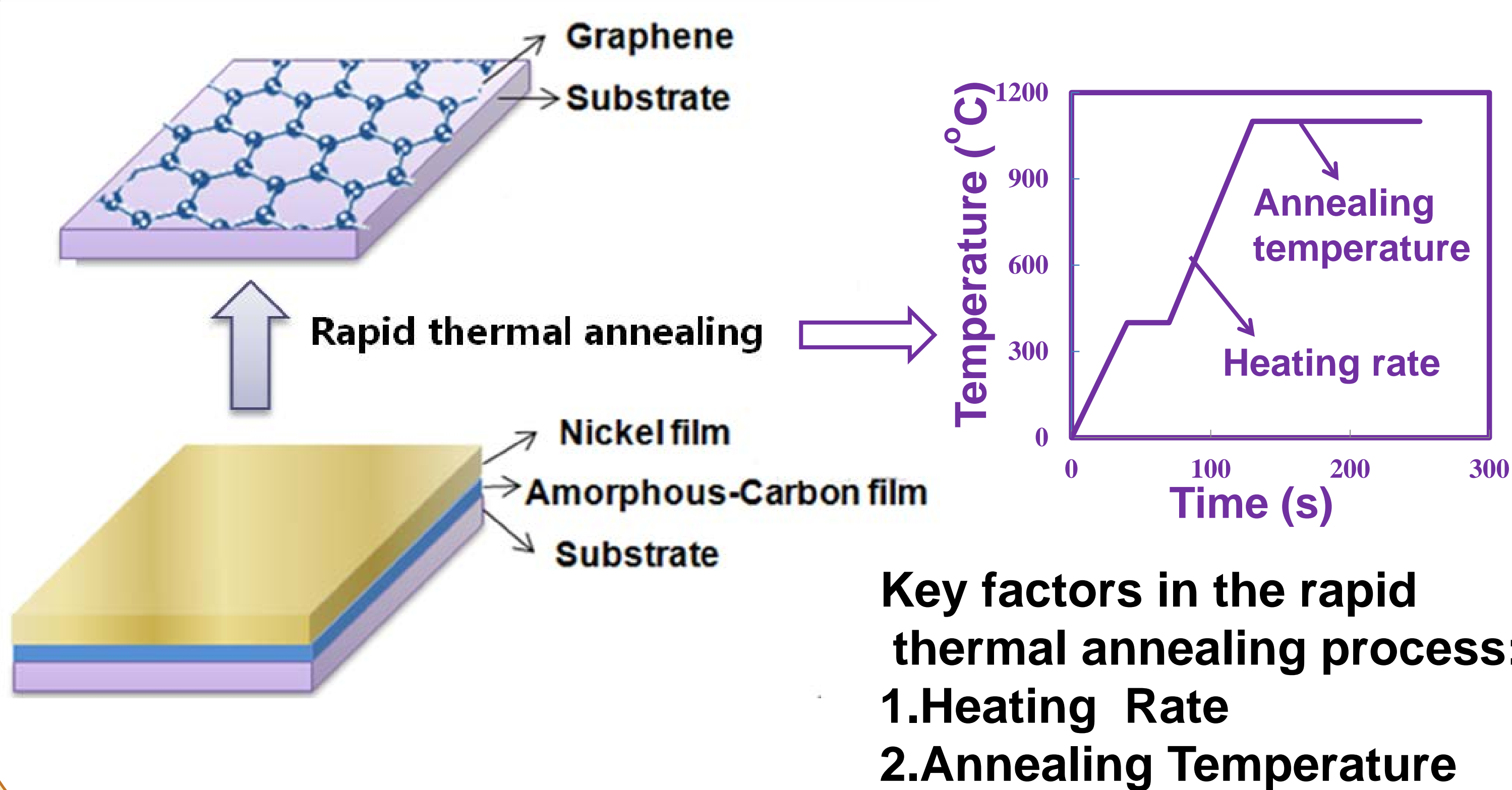1. Heating Rate
2. Annealing Temperature
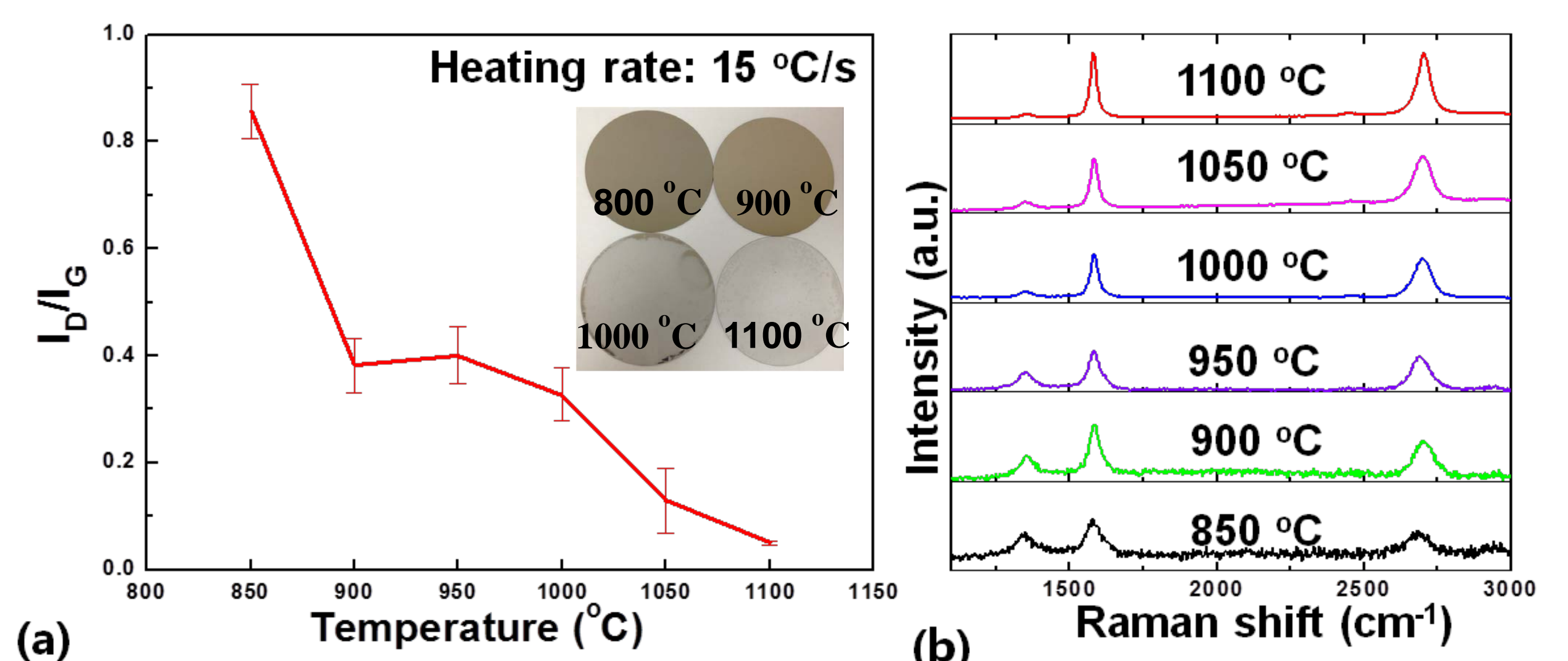
Influence of Heating Rate

The influence of heating rate when the annealing temperature is set at 1100 °C. (a) D/G ratio plot as a function of heating rate. (b) Corresponding Raman spectra.
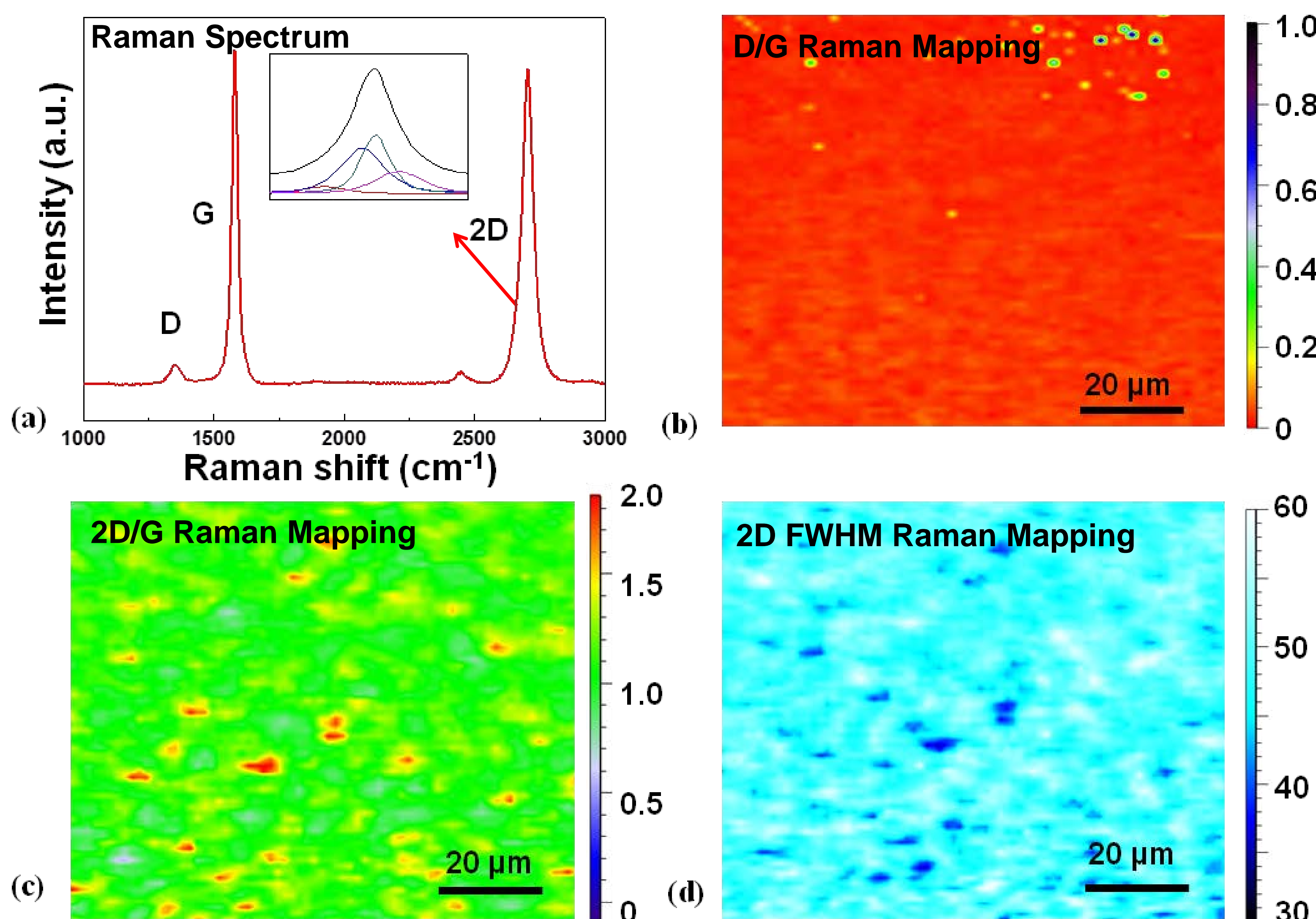
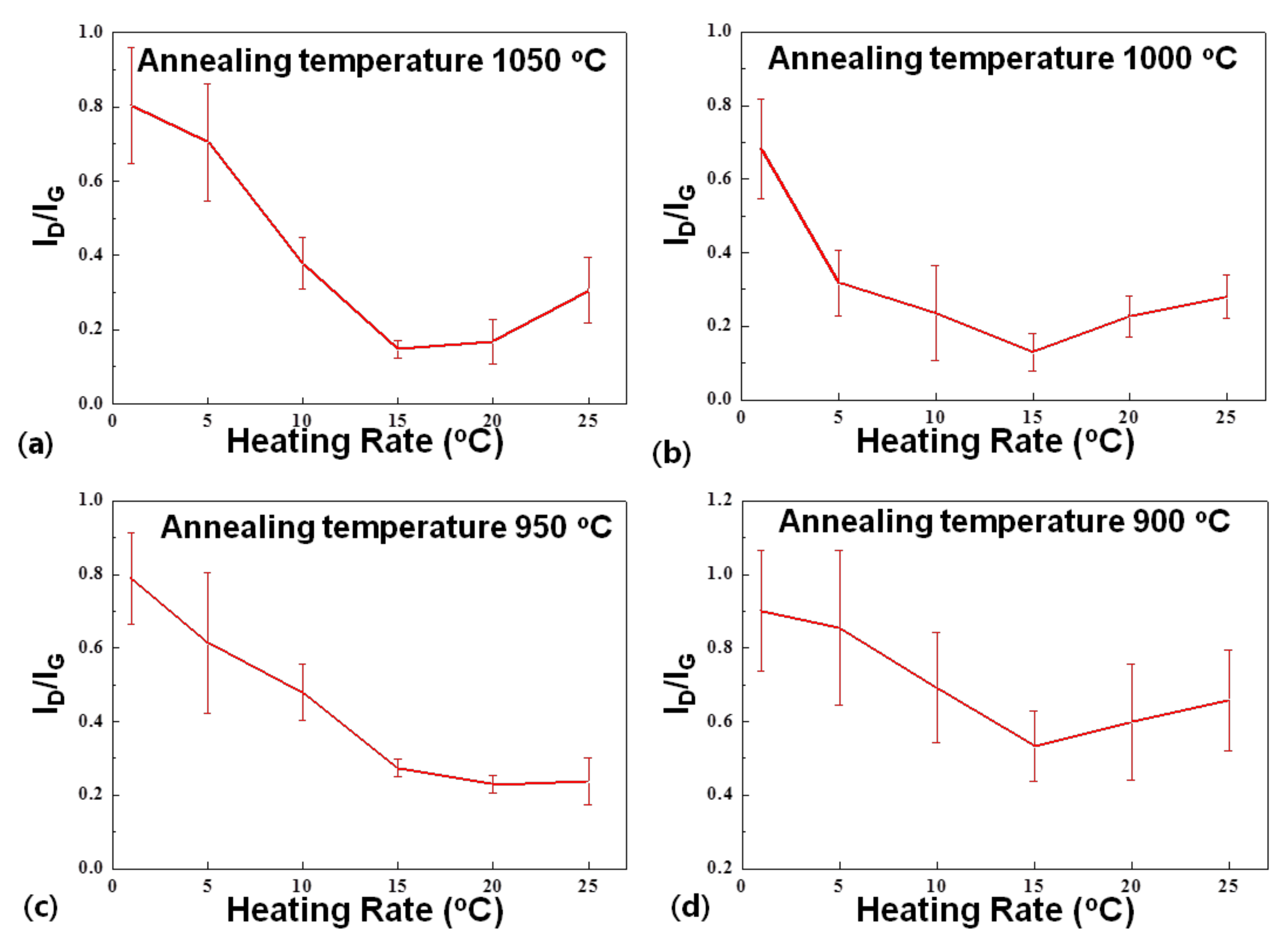## Influence of Annealing Temperature

The influence of annealing temperature when the heating rate is set at 15 °C/s. (a) D/G ratio plot as a function of annealing temperature. (b) Corresponding Raman spectra.
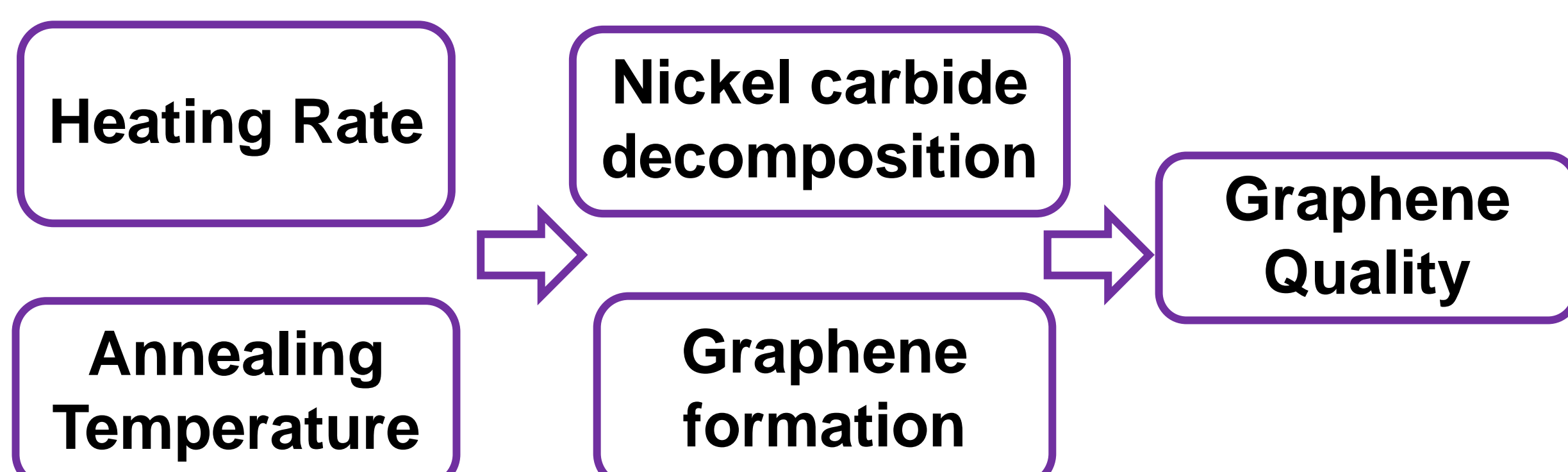
Characterization

Raman characterization of rapid thermal annealing (RTP) bi-layer graphene.
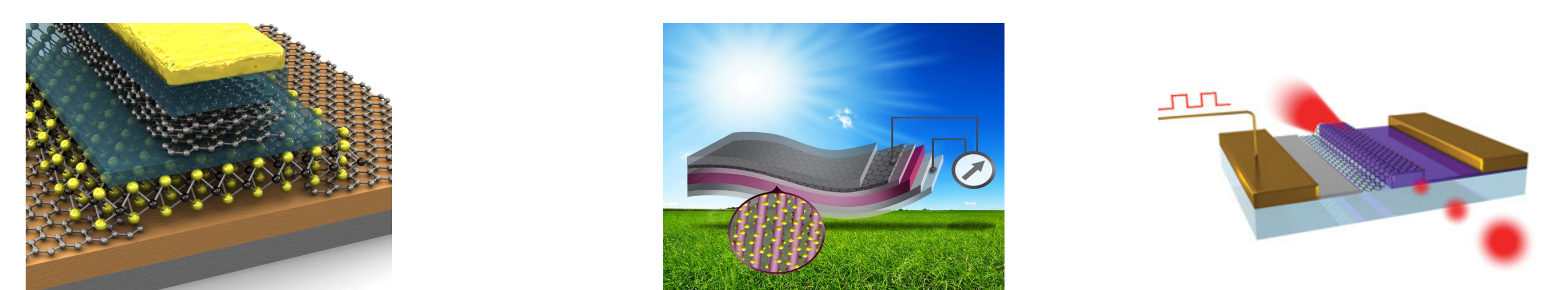
Control Experiments

Control experiments of the RTP graphene growth. (a)~(d) D/G ratio plot as a function of heating rate under 1050, 1000, 950, and 900 °C, respectively.

Conclusions

Heating Rate

Annealing Temperature

Nickel carbide decomposition

Graphene formation

Graphene Quality

Future Directions

Graphene Heterostructure   Graphene Solar Cell   Graphene photonics

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