

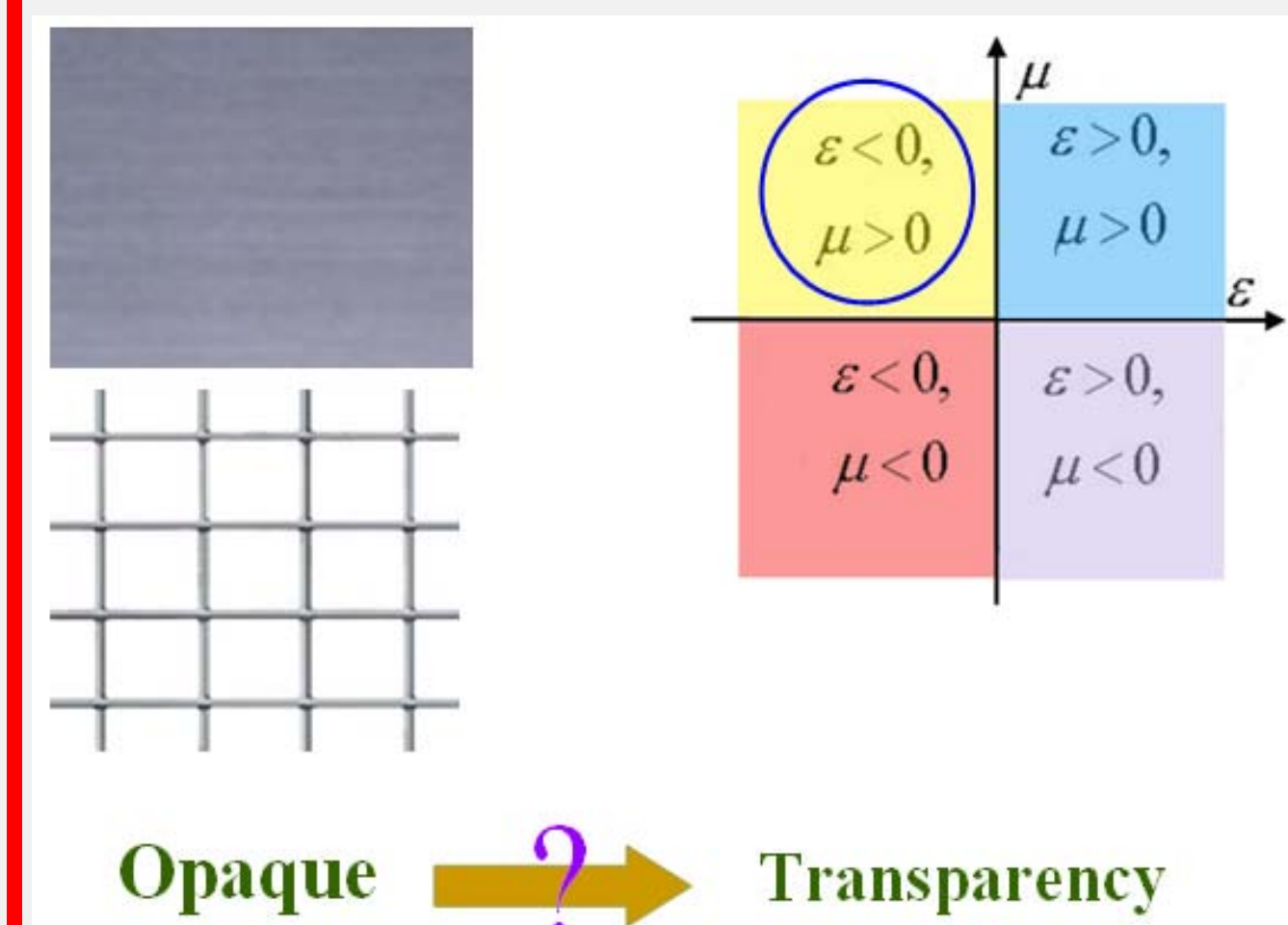


Making a continuous metal film transparent via scattering cancellations

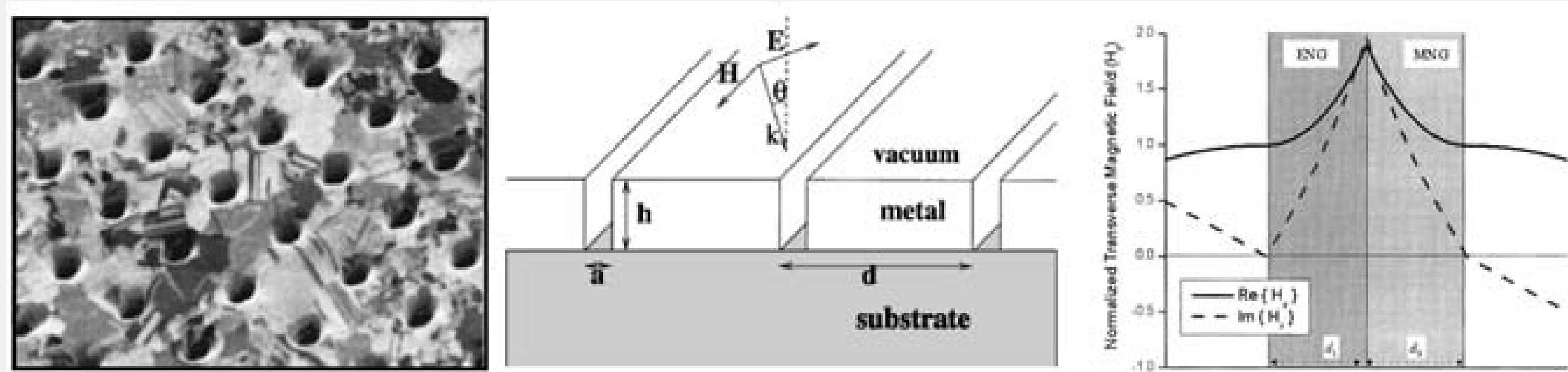


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Background



Previous mechanisms



SPP band-folding

Fabry-Perot resonance

Interface resonance

*Sensitive to period
 Low transmission*

*Strongly depend on thickness
 No subwavelength*

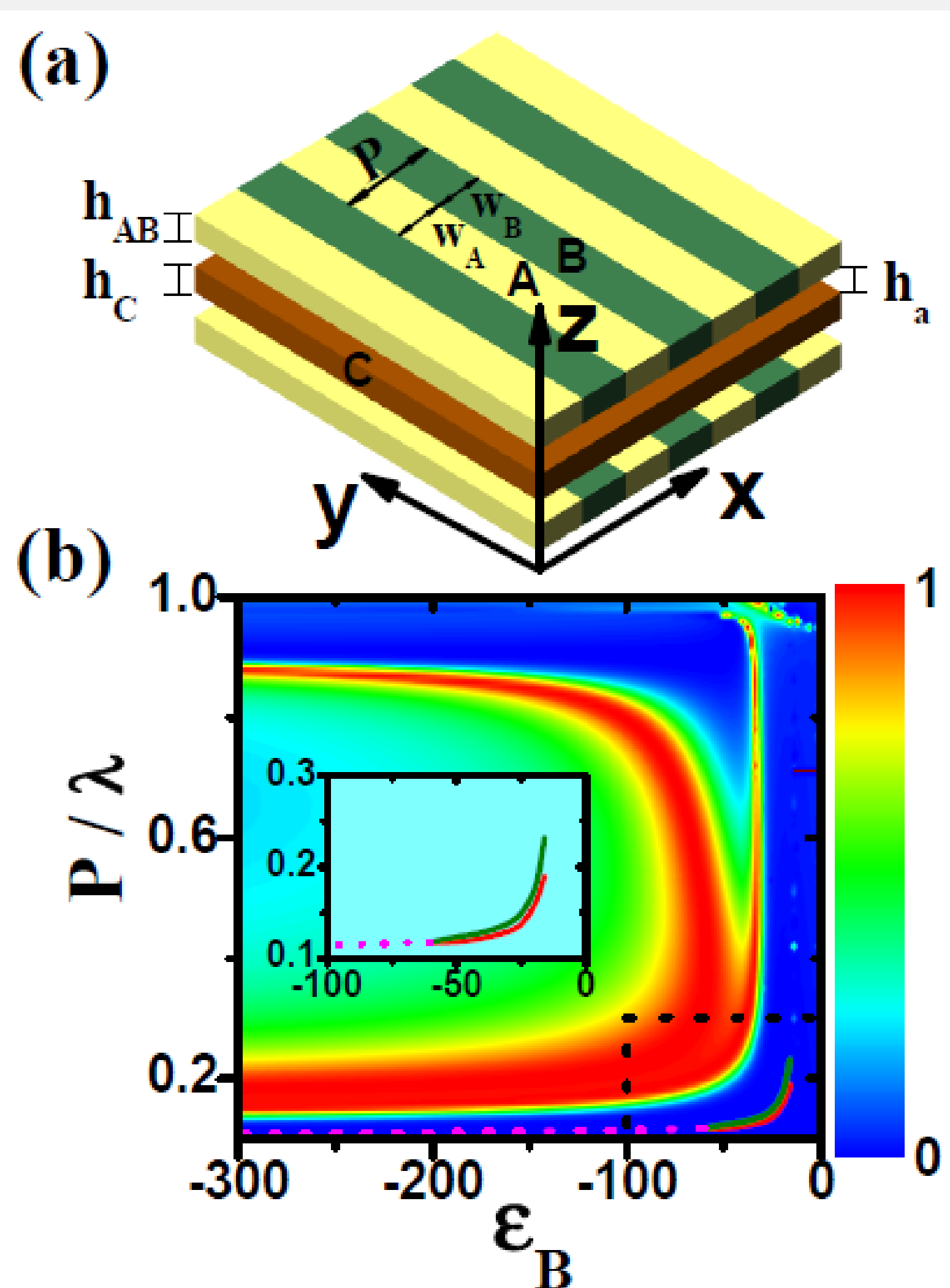
*Not easily realized in
 visible or IR region*

Our Motivations

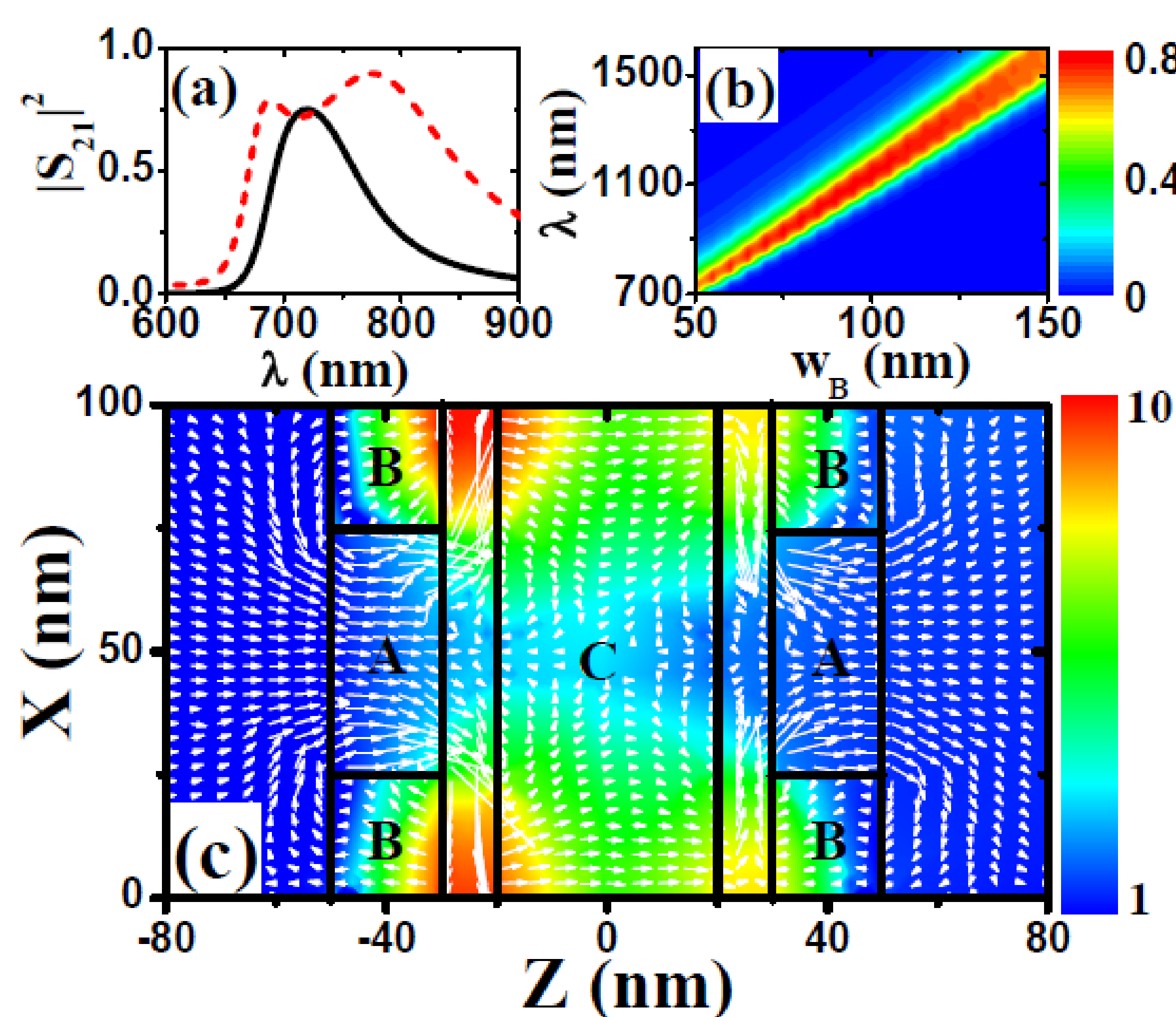
- ① *Structureless metal film*
- ② *High transmission*
- ③ *Insensitive to disorder*
- ④ *Ultra-width band*
- ⑤ *Highest conductivity*

Metamaterial opens up new paths!

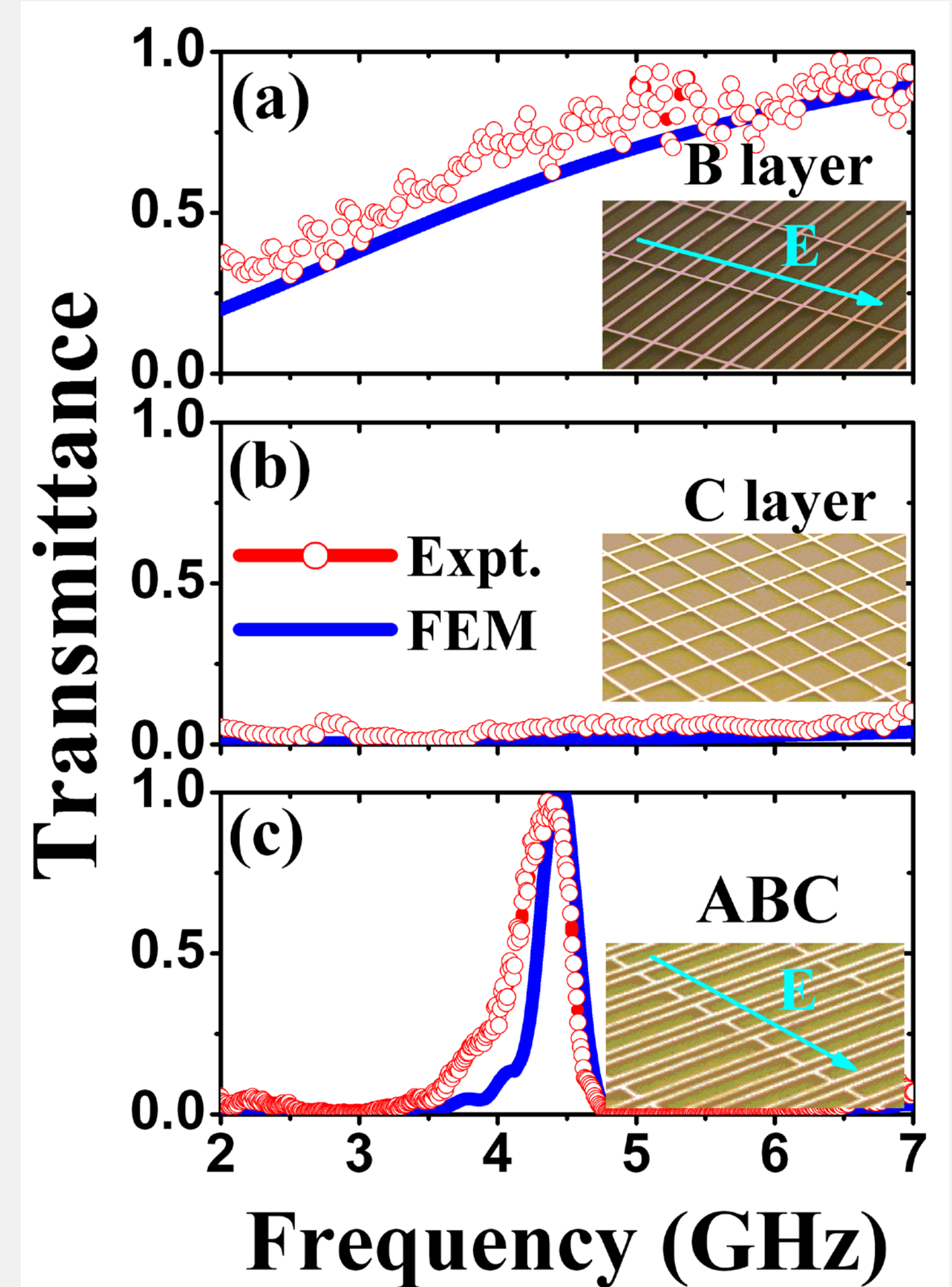
Theoretical model



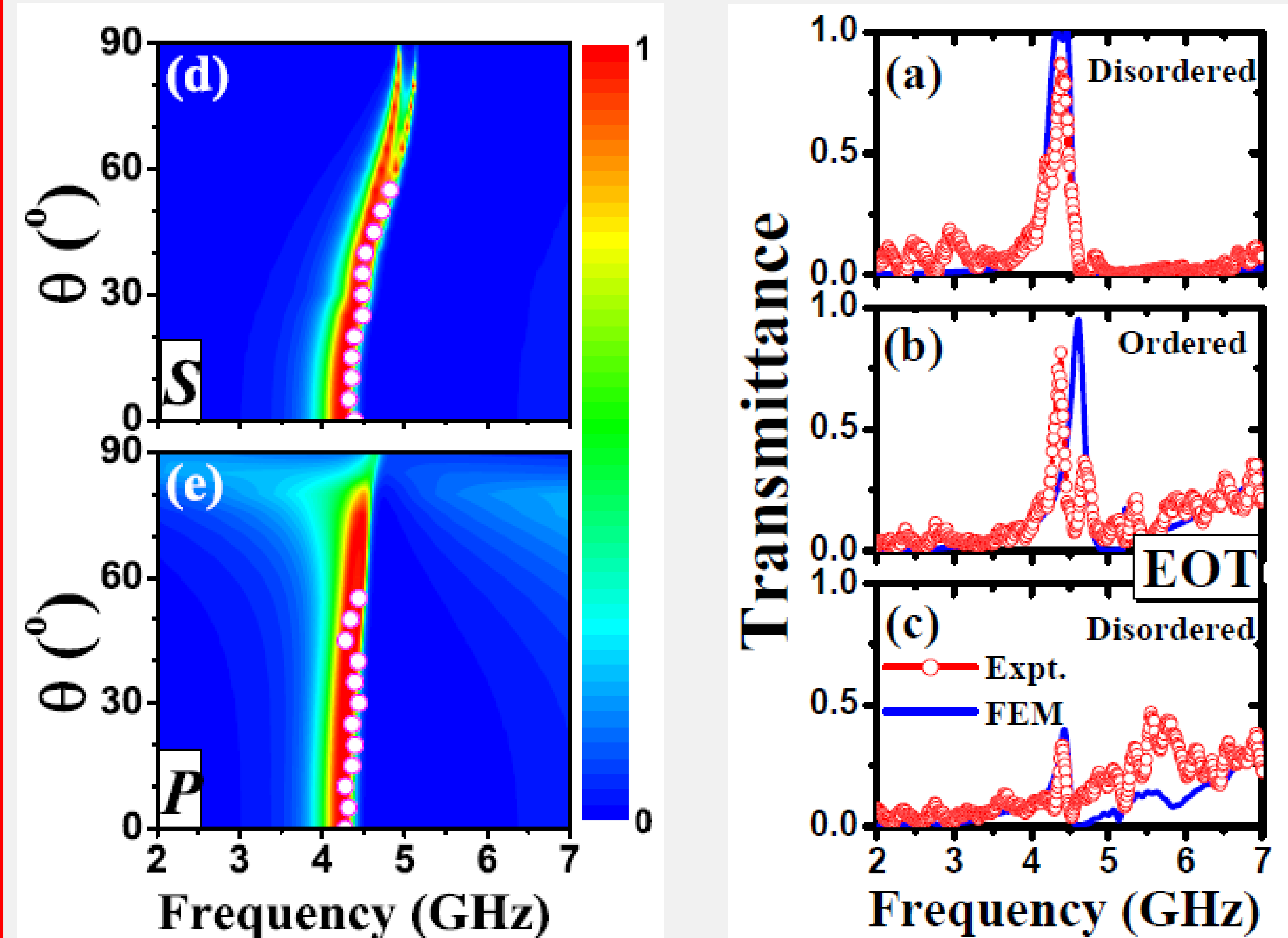
Realization in IR



Simulation & Experiment



Independent of incident angle and robust against disorder



Conclusions:

1. Make a continuous metal film transparent by means of a new scheme
2. Independent of incident angle and disorder compared with other methods
3. Keep structural integrity
4. Retain the full conductivity of the targeted metal
5. Good agreement between FDTD simulation and experimental results

References:

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- [6] Lei Zhou, *et al*, PRL **94**, 243905 (2005).
- [7] Zhengyong Song, *et al.*, submitted.