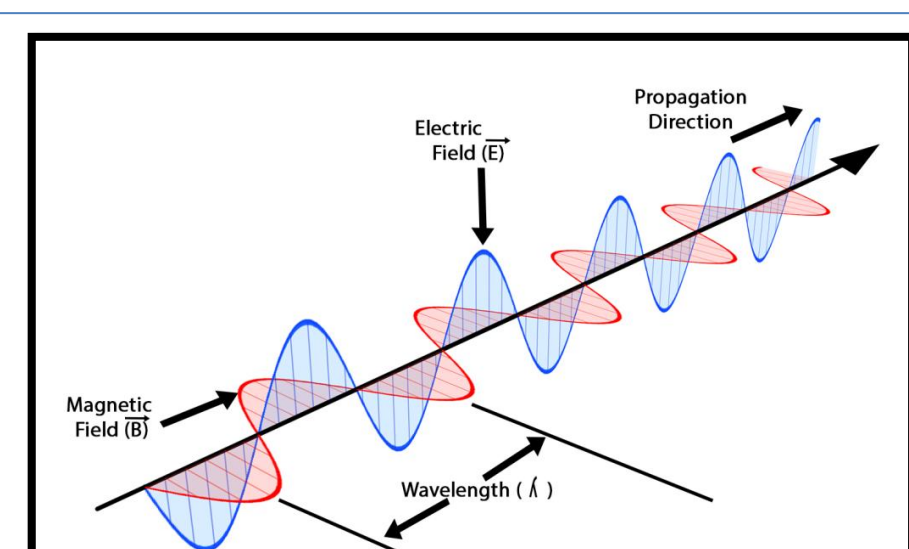
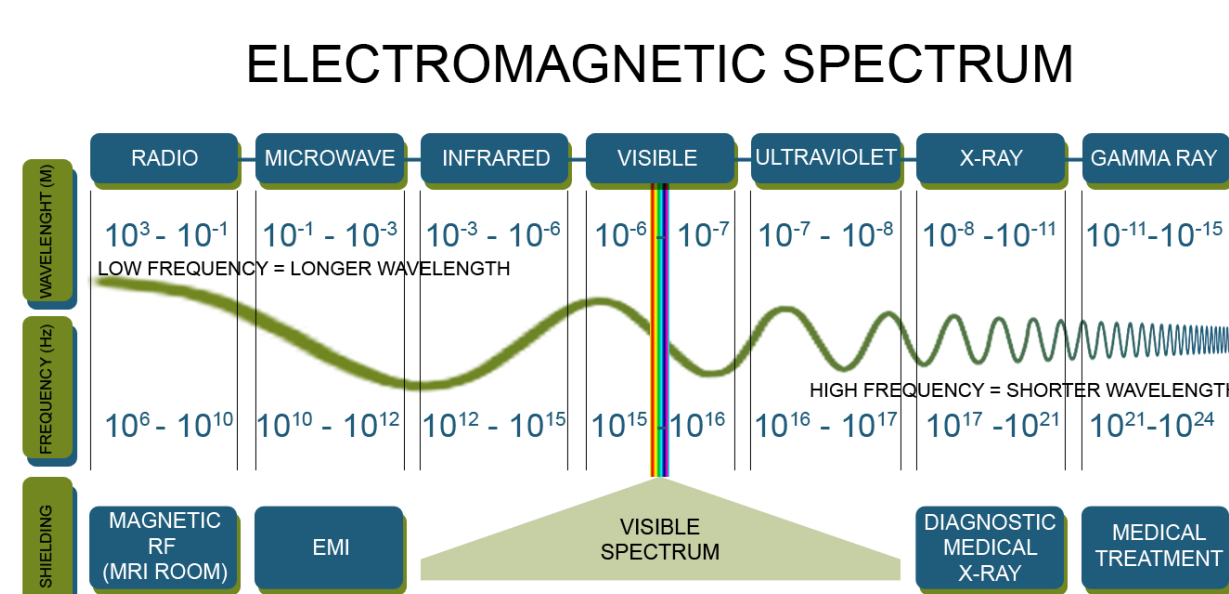
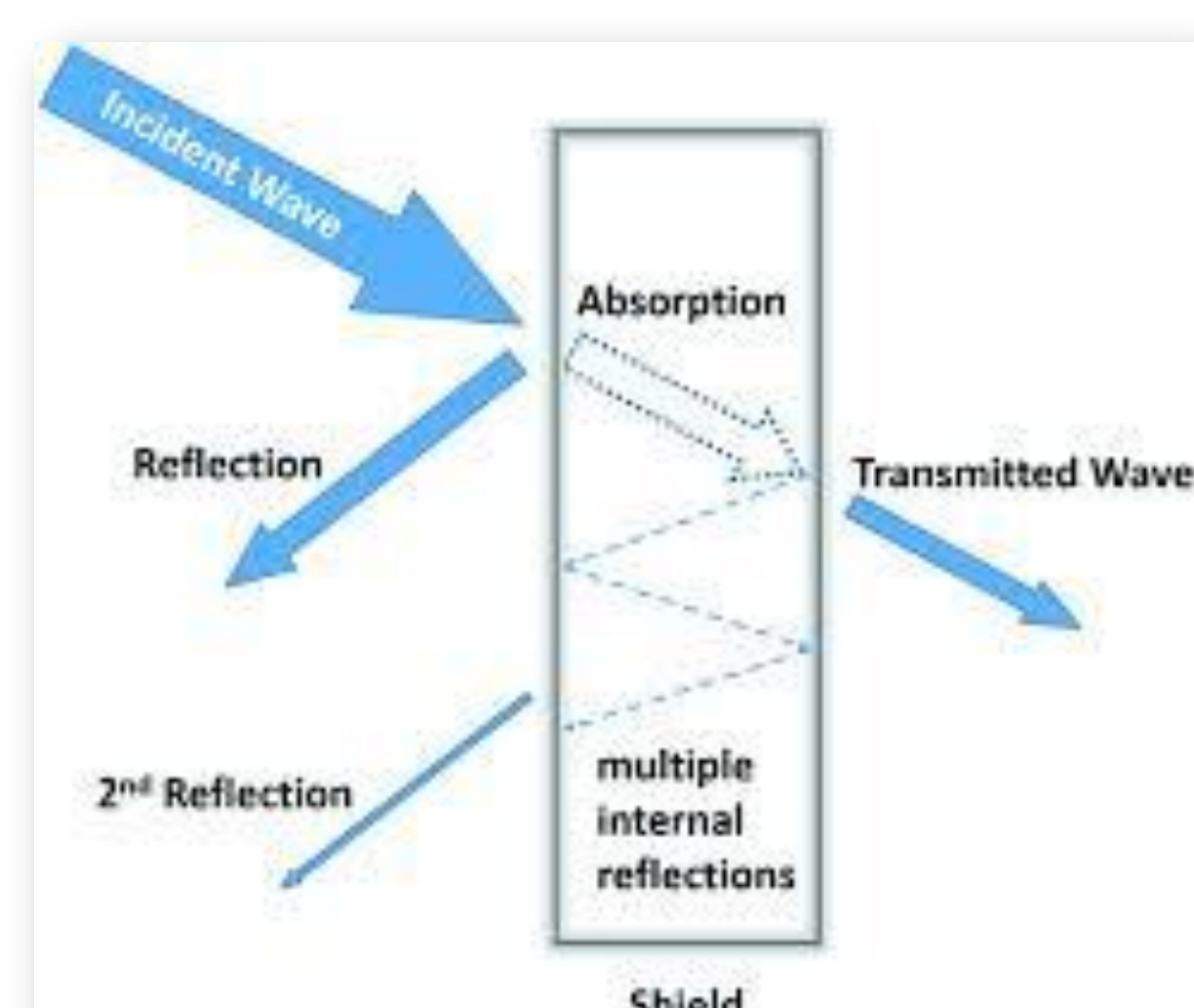


## Introduction to EMI Shielding

- With the widespread use of electronic devices, electromagnetic interference (EMI) has become a serious problem.
- These EMI can cause operational malfunctions of electric devices, such as medical apparatuses and industry robots, which lead to significant losses in time, energy, resources, and money.
- EMI can also harm our bodies by causing diseases such as leukemia and breast cancer.
- Thus, the search for materials that have effective EMI shielding properties has been the focus of recent research.
- Traditionally, metals and metal oxides have been used as EMI shielding materials. These materials provide EMI shielding by reflection of the electromagnetic waves.

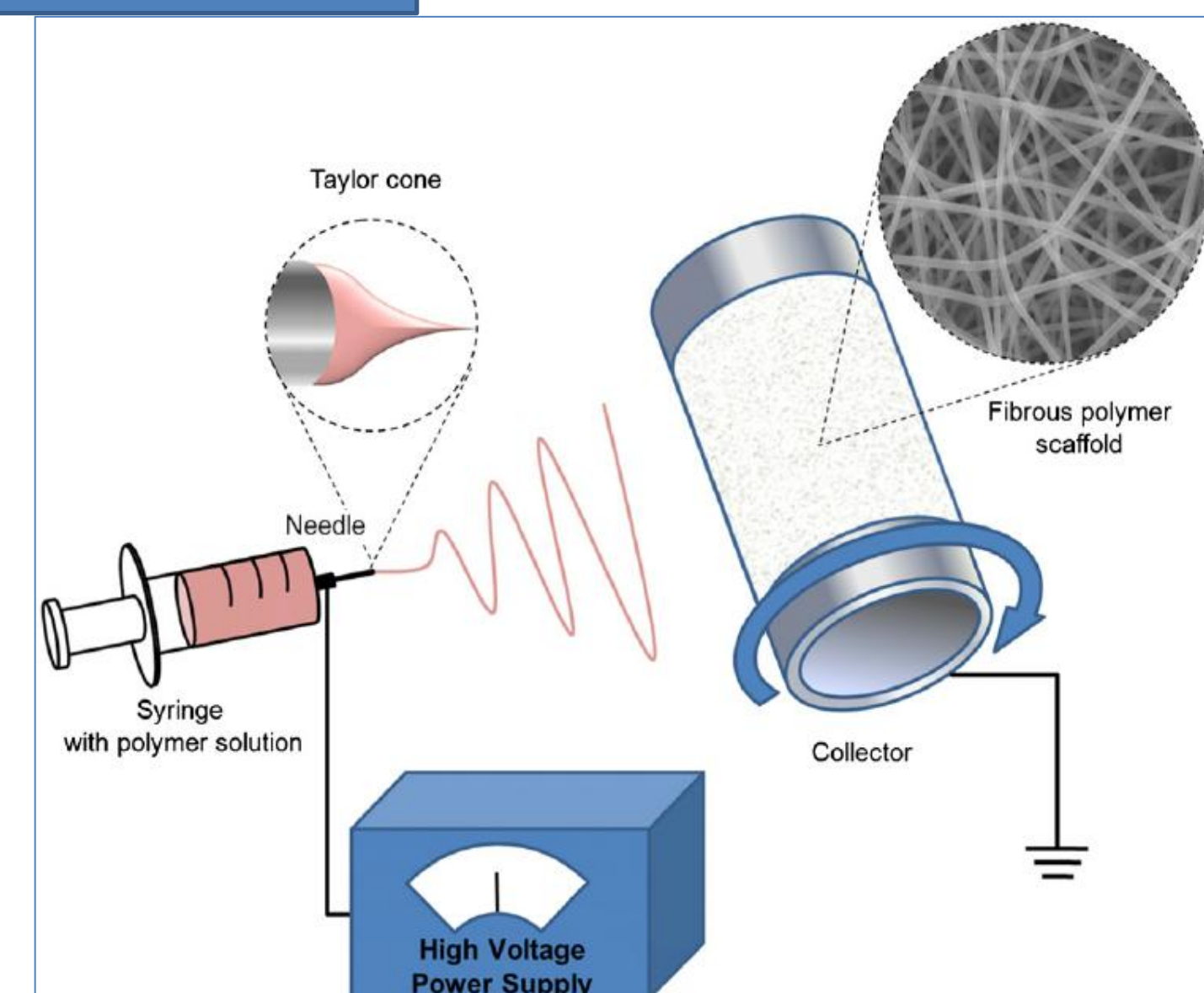


## Mechanism of Shielding<sup>2</sup>

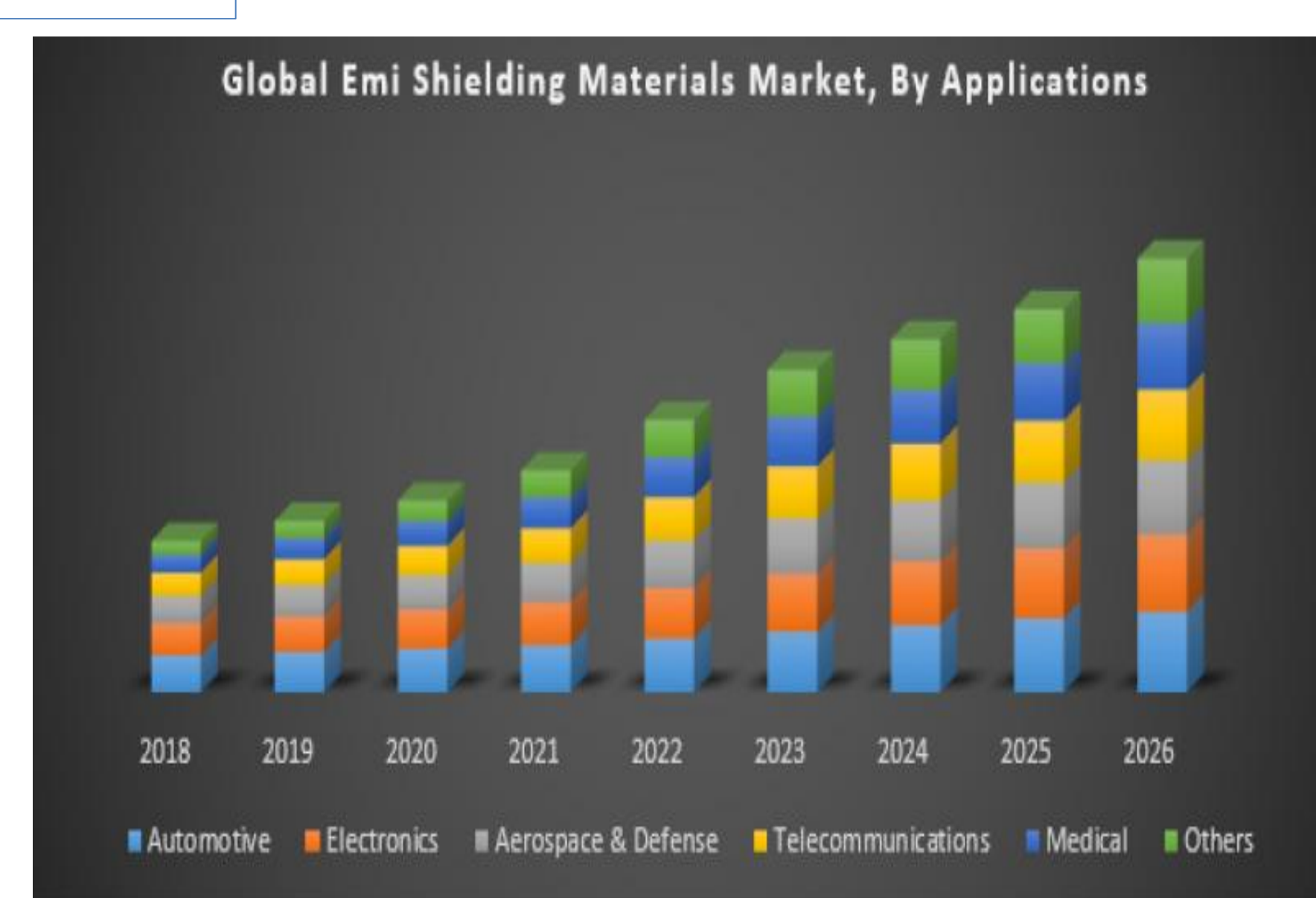
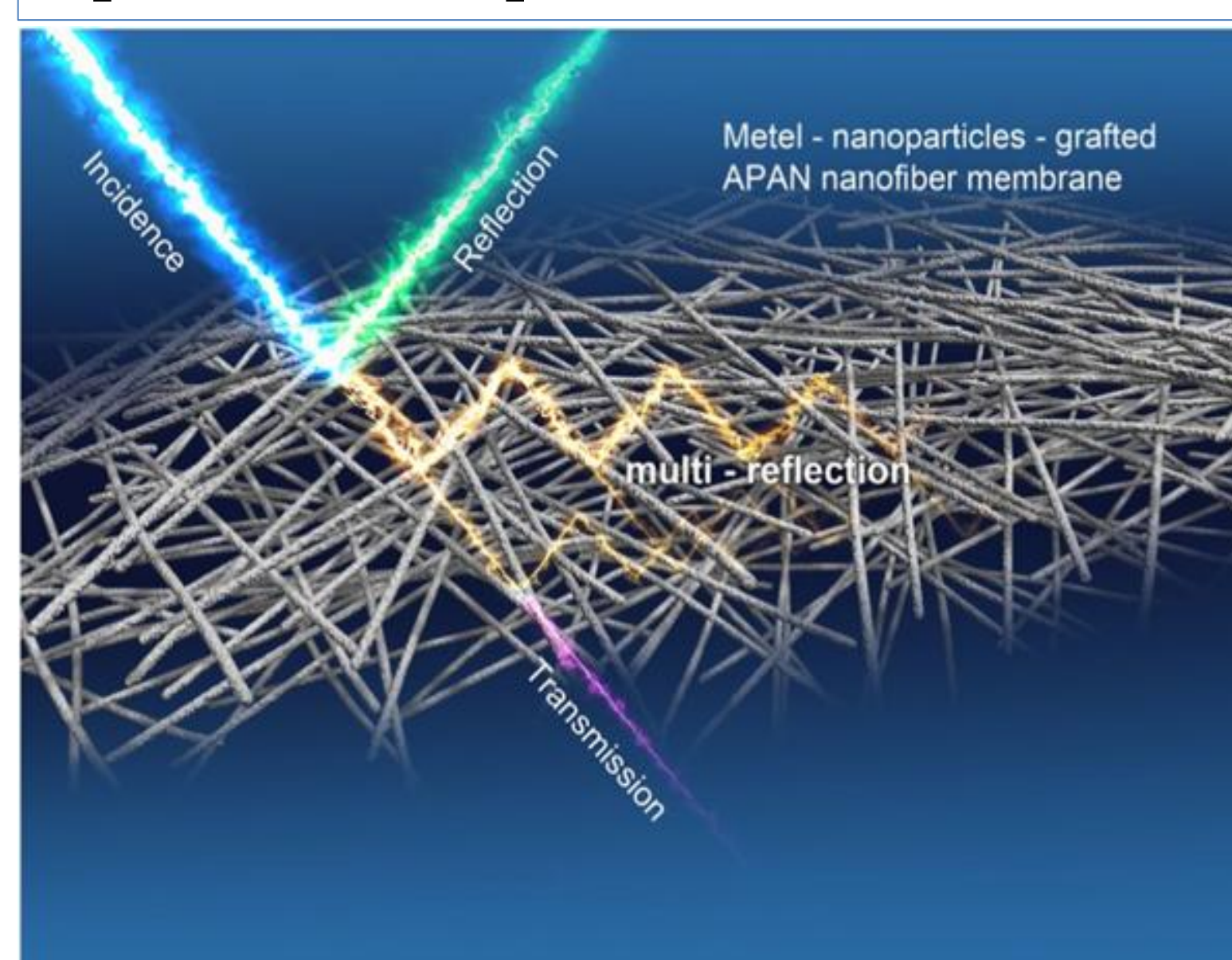


## Electrospun fibers as EMI Shields

- Electrospinning is one of the versatile technique to form continuous nanofibers from polymer solutions.
- The polymer solutions are subjected to electrostatic repulsive forces, which tends to form stream of jet, when these repulsive forces overcomes the surface tension.
- The acceleration voltage, polymer viscosity, flow rate, distance b/w collector and needle, and speed of collector are the important parameters that define the final morphology of fibers
- Ease of processability, scaling up capability, relative low cost are the main attributes
- We can achieve different types of morphology by using experimental setups

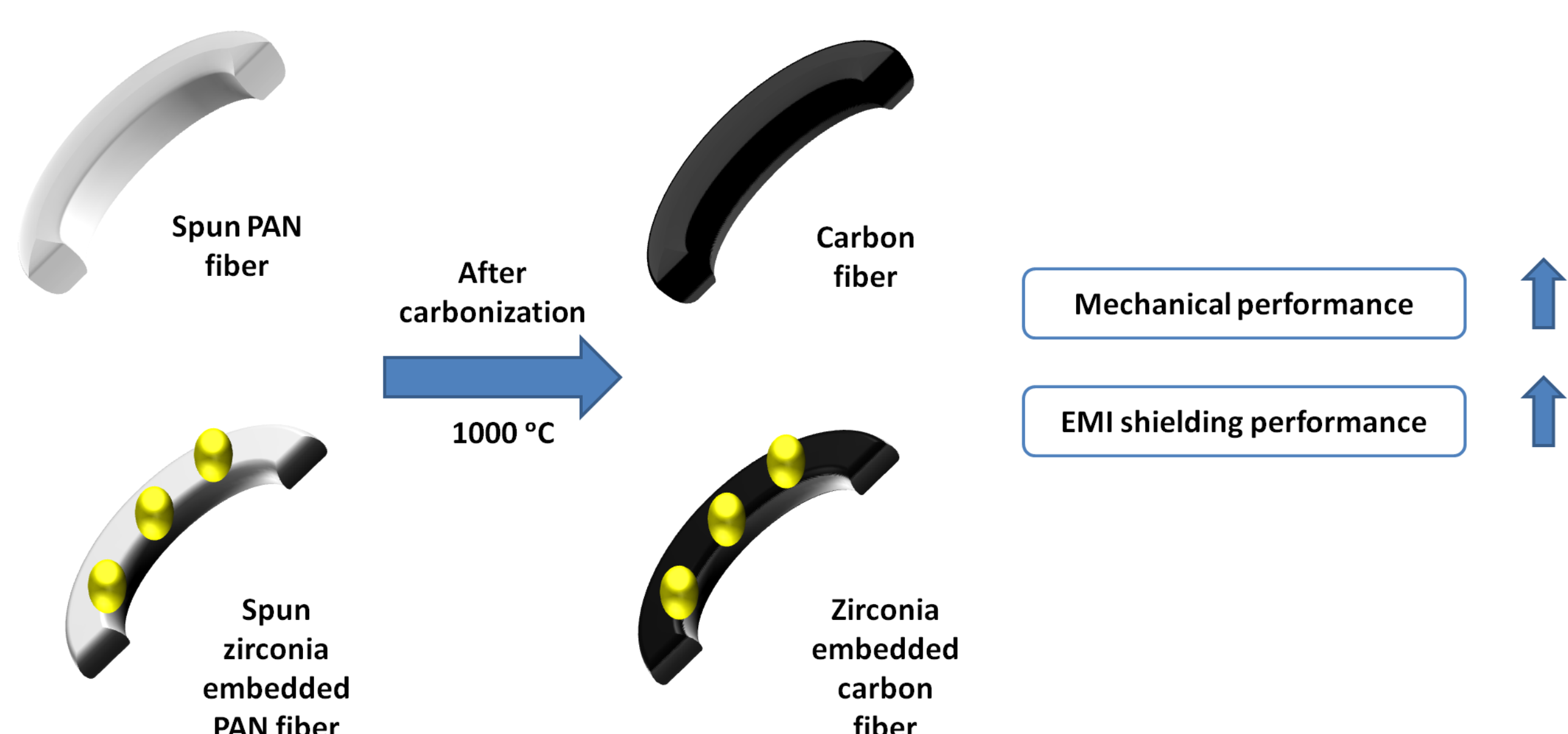


Schematic representation of electrospinning<sup>1</sup>

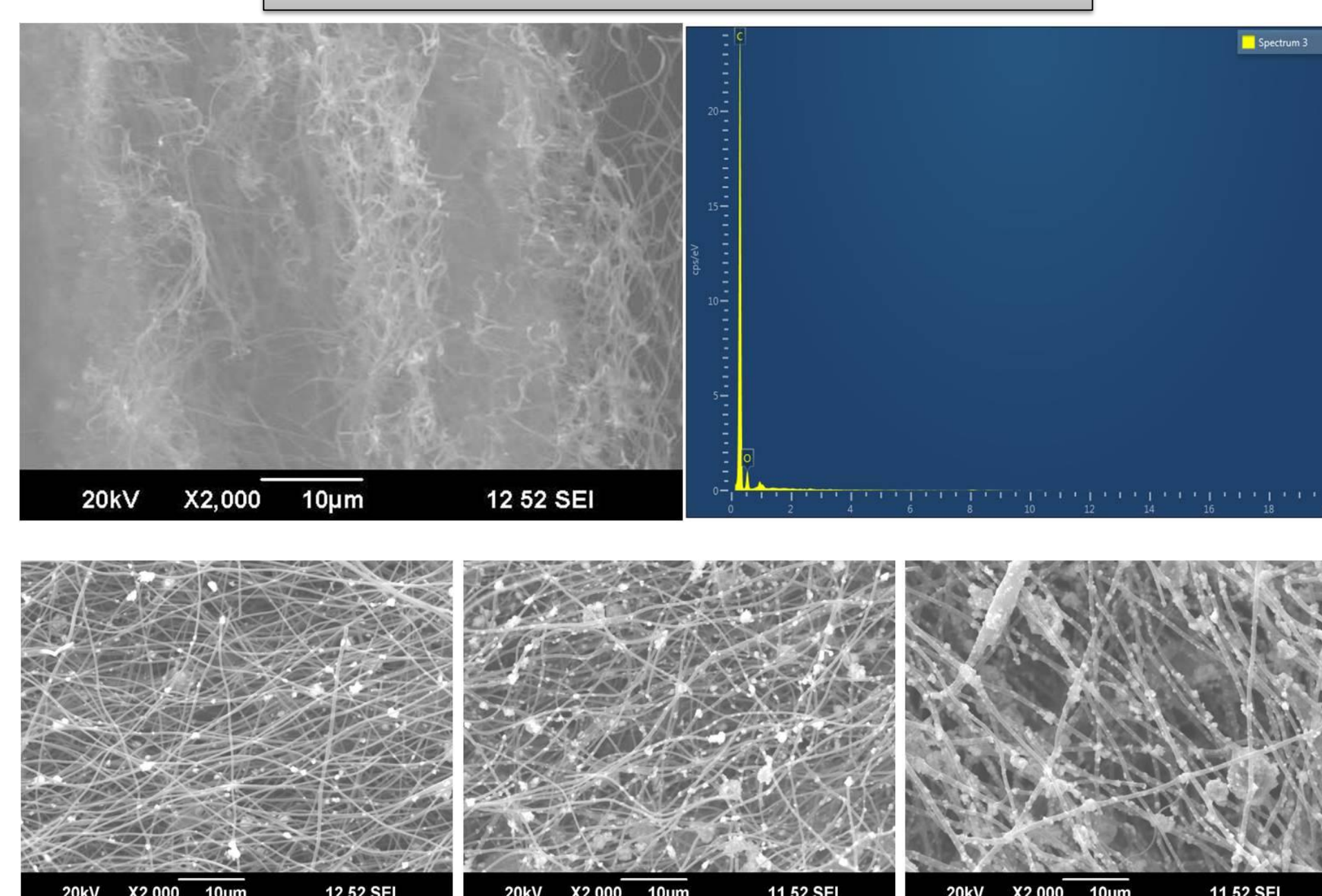


## Results and Discussion

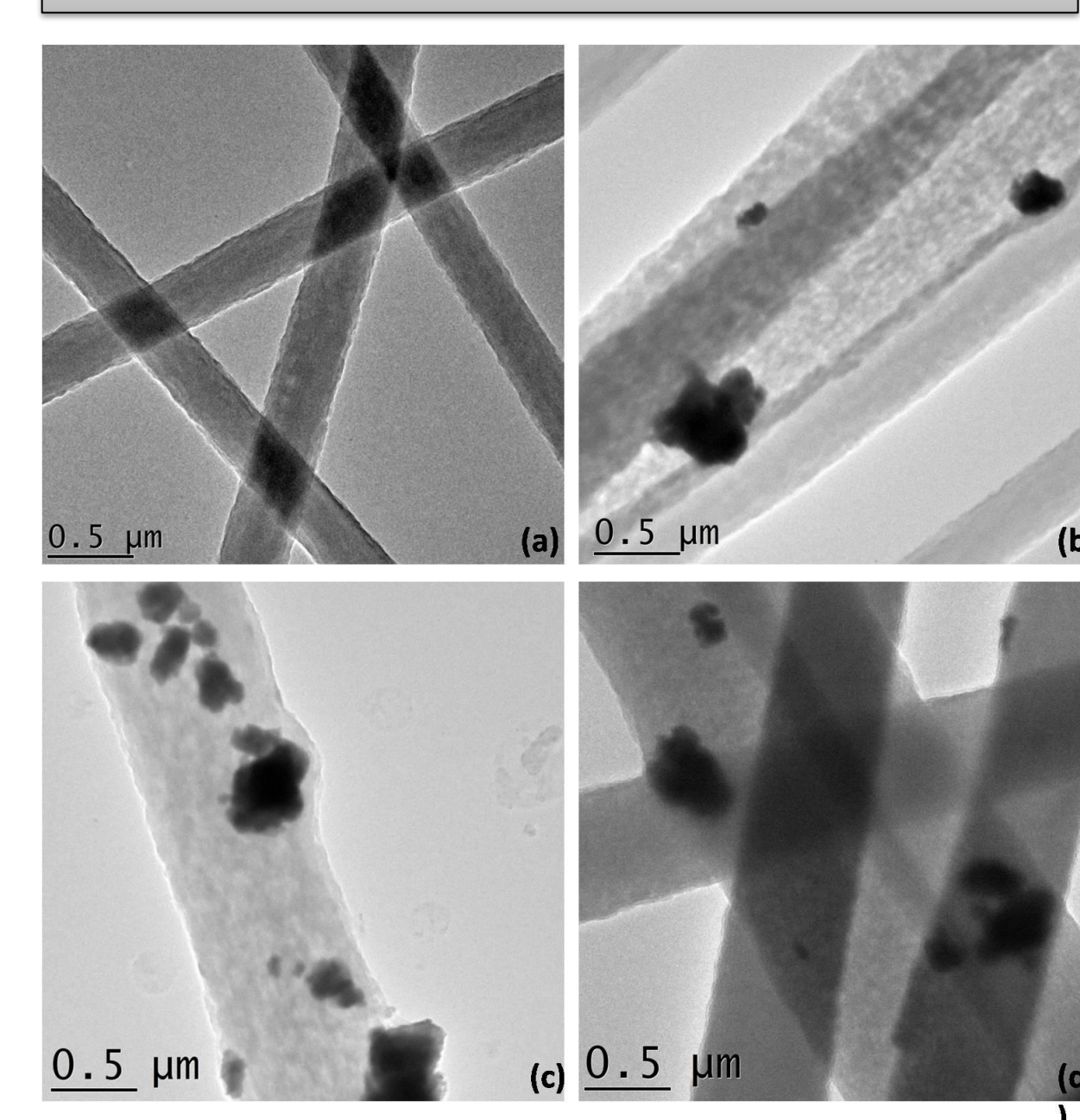
### Schematic representation of Zirconia loaded fibers



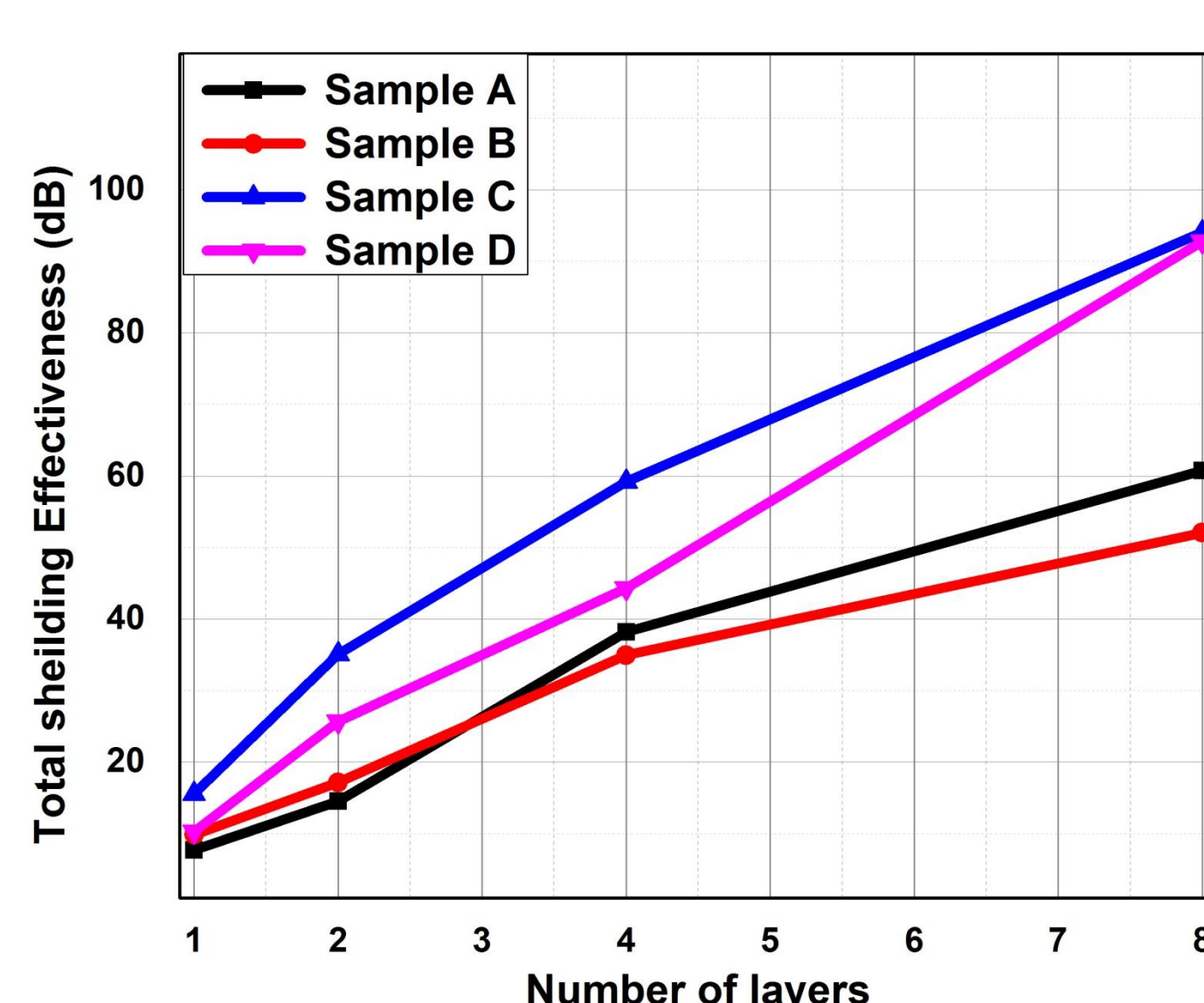
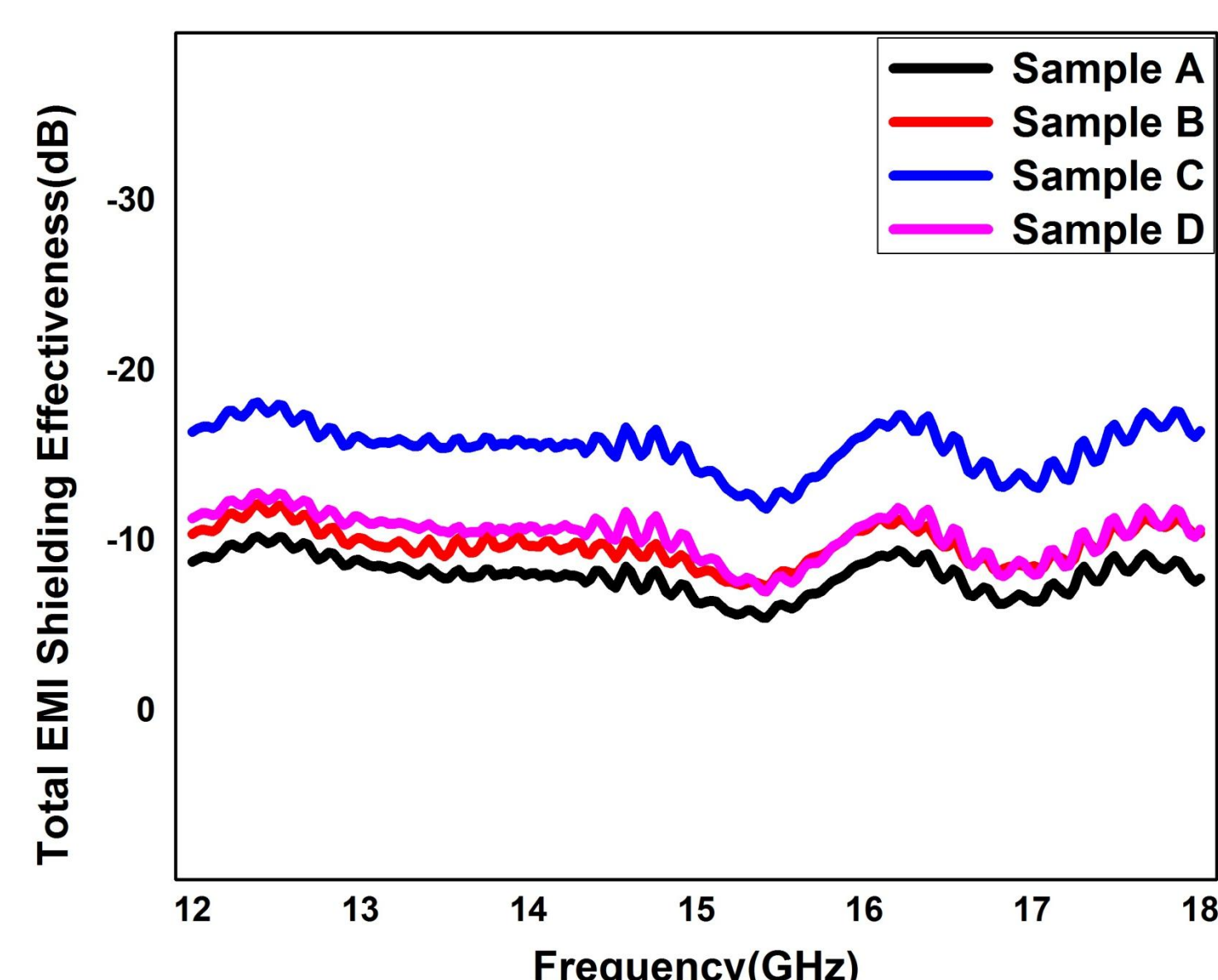
### SEM-EDAX



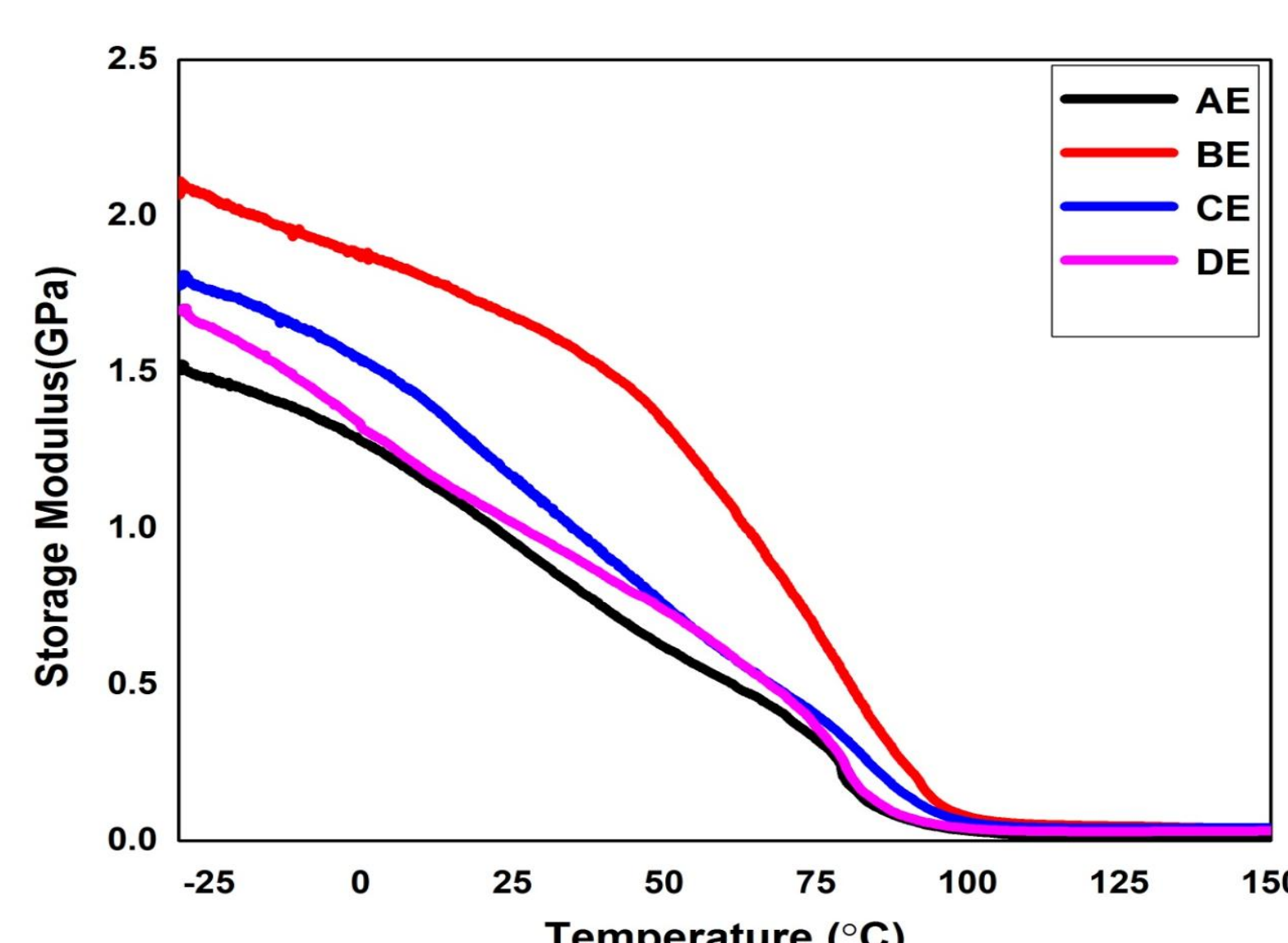
### TEM Micrographs



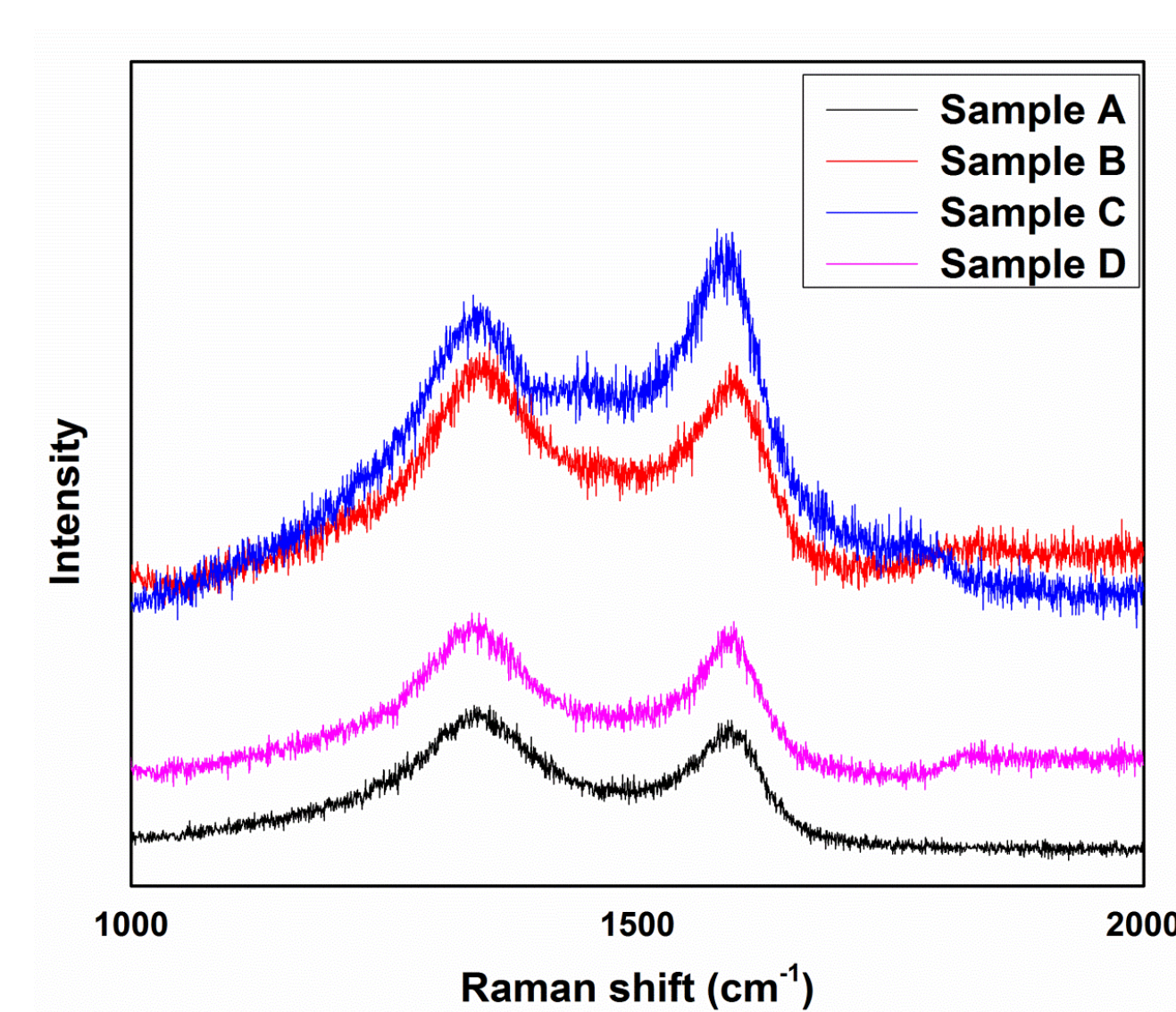
### EMI Measurements



### DMA analysis



### RAMAN Spectra



## Conclusions

- Zirconia embedded carbon nanofibers were prepared successfully by electrospinning and subsequent carbonization.
- Thus prepared mats displayed excellent EMI shielding effectiveness and the effectiveness is observed to increase with no of layers.
- Further these mats are incorporated with epoxy and epoxy laminates were prepared
- These epoxy laminates are observed to have good mechanical properties as well as enhanced EMI shielding capability.

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6. <https://socratic.org/questions/5716864011ef6b647cb464d9>