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## Packaged Silica and Chalcogenide Microspheres and Their Applications for Telecommunications

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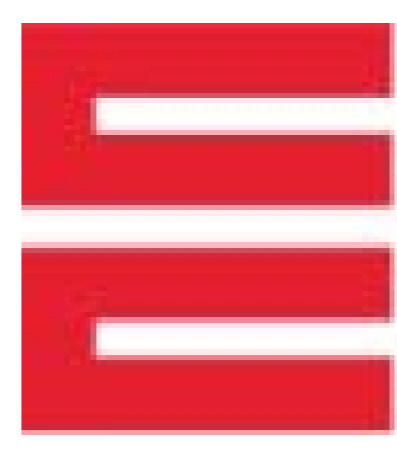
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# Packaged silica and chalcogenide microspheres and their applications for telecommunications

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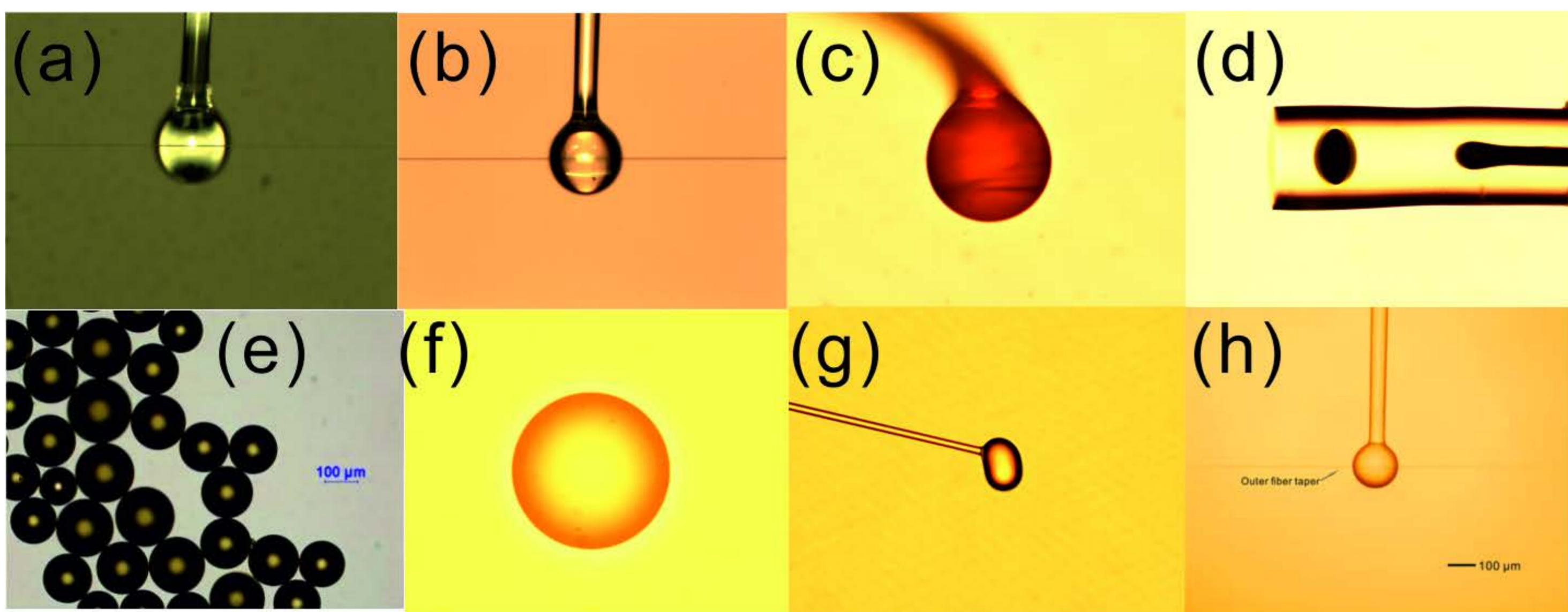
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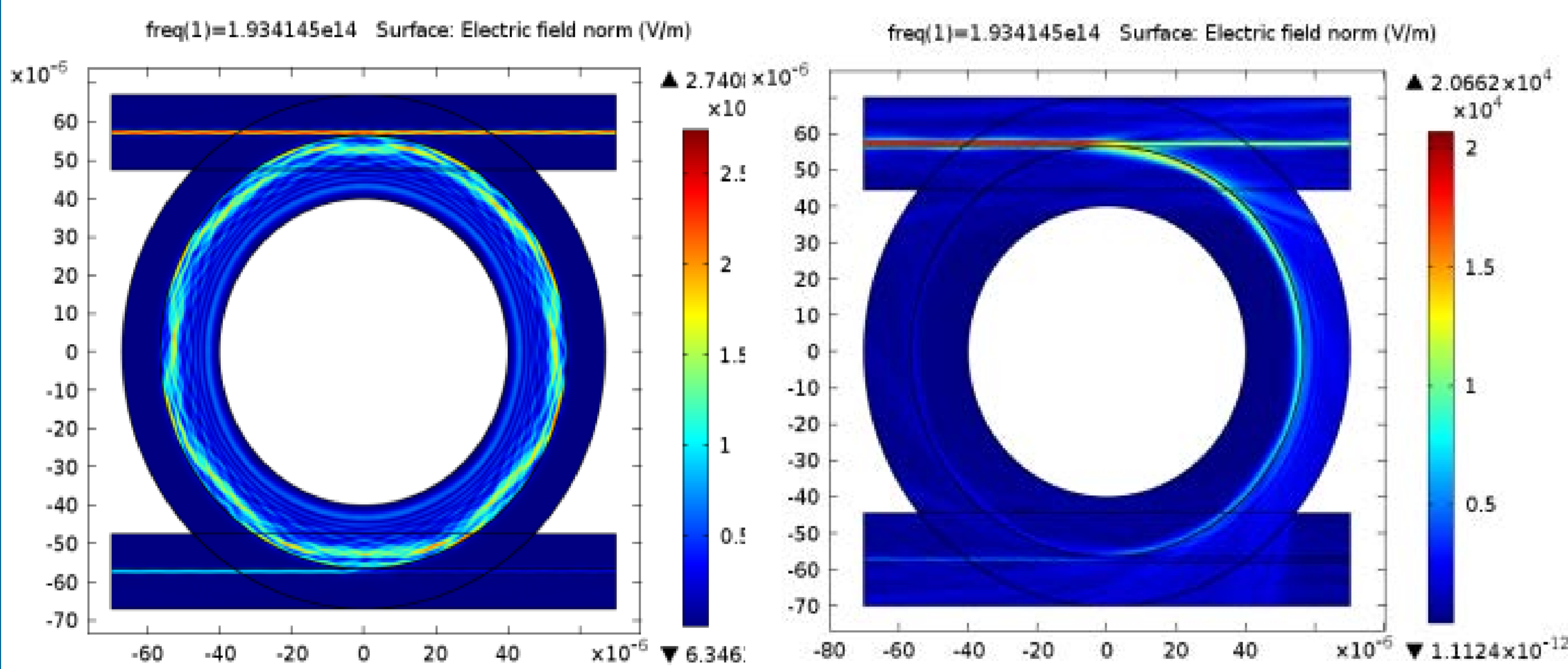
## Objective

To investigate, both theoretically and experimentally, packaged silica and chalcogenide microsphere and their potential applications in telecommunication.

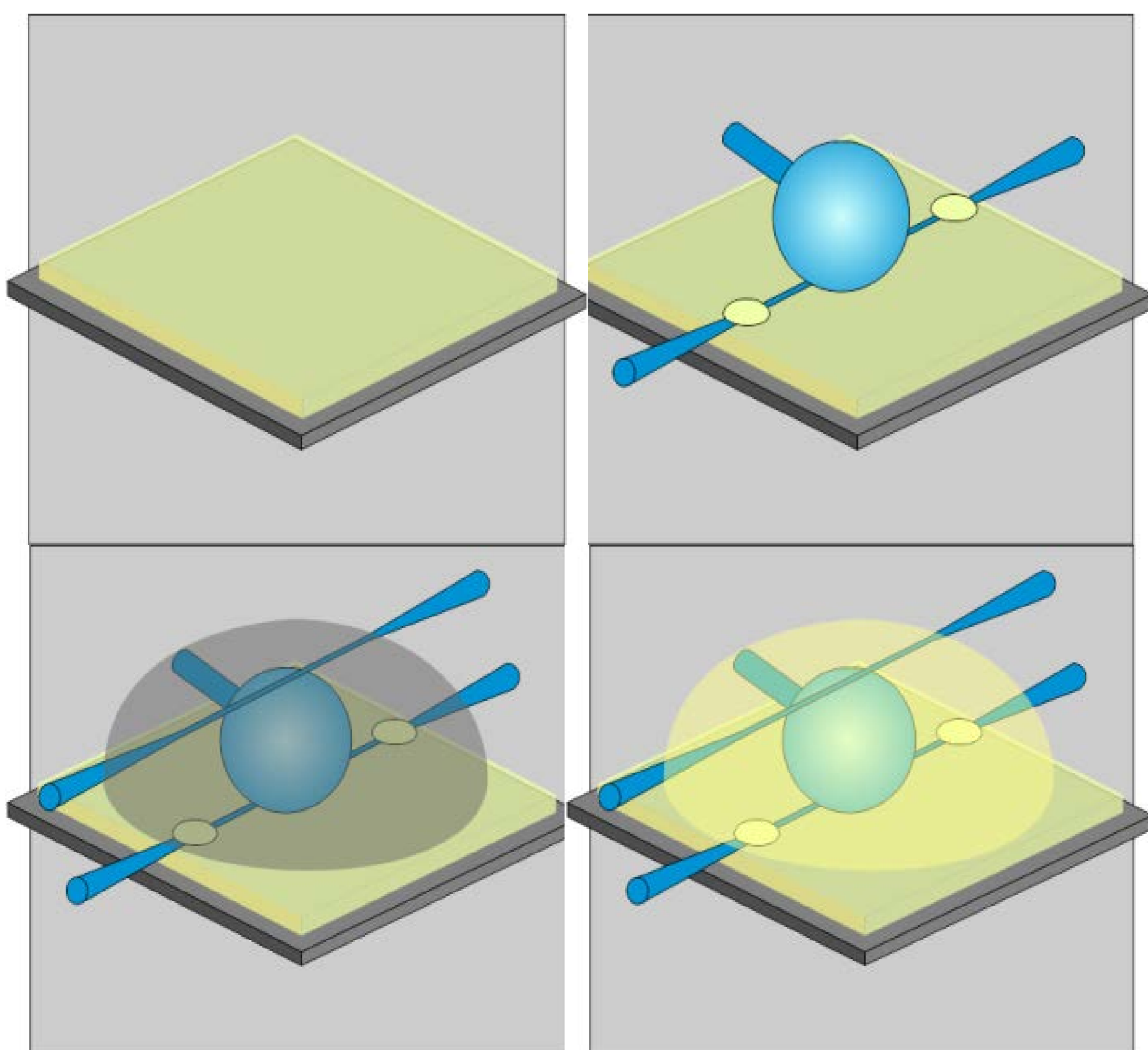
## Silica and soft glass microspheres fabricated to date



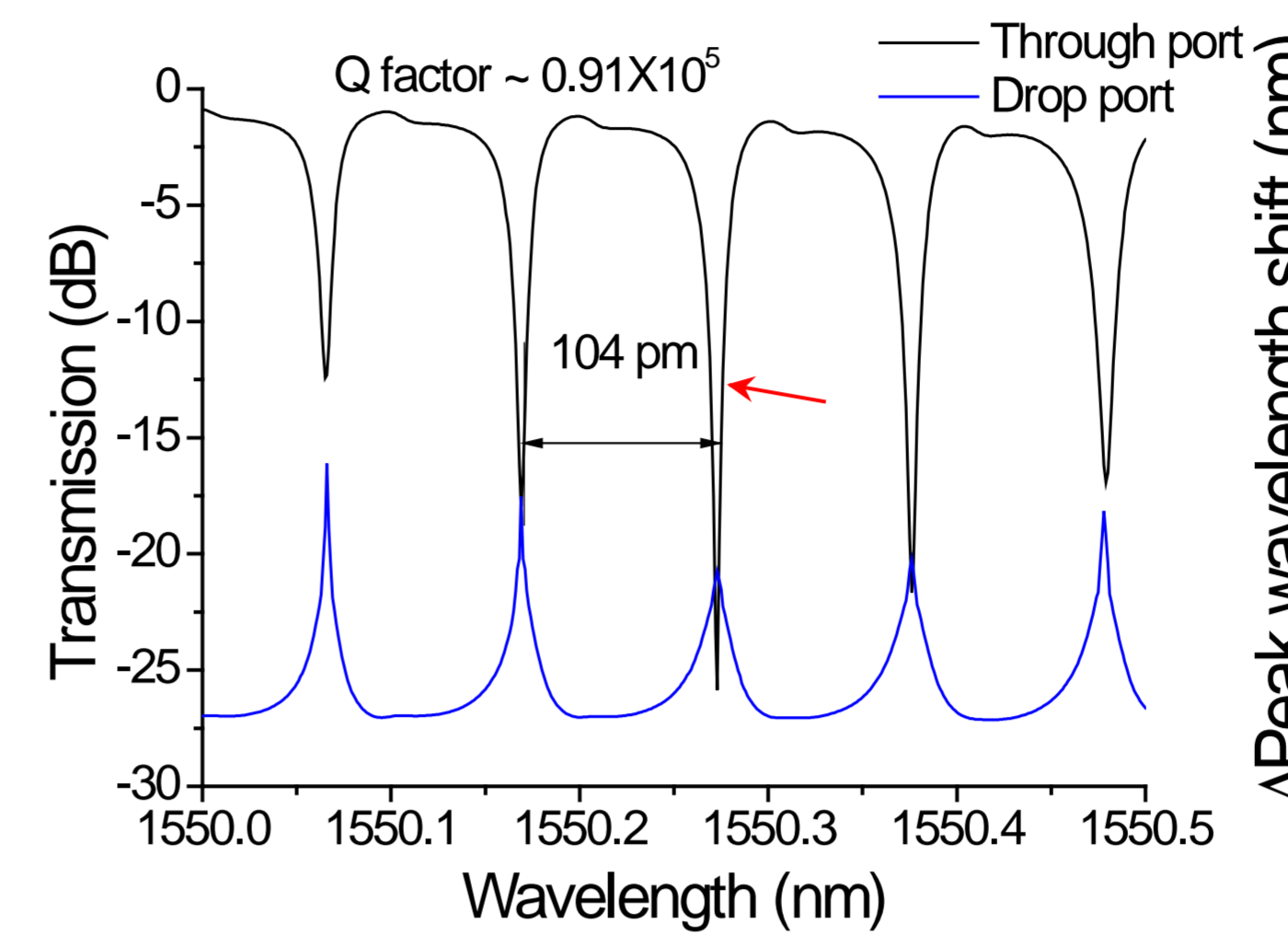
## Packaged silica microsphere



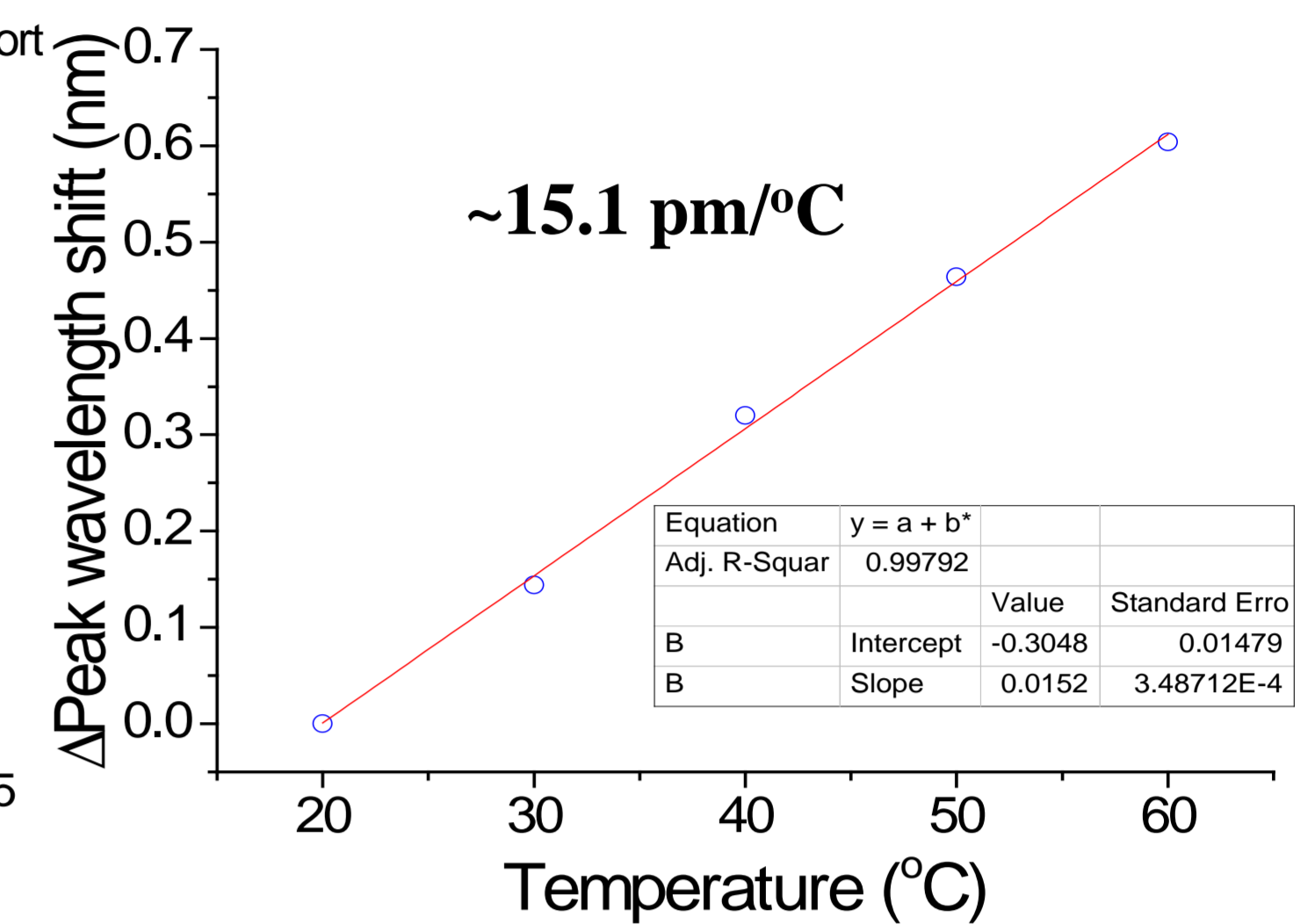
Simulated electric field distribution for a silica microsphere coupled with two tapered fibers in air and polymer



Fabrication process

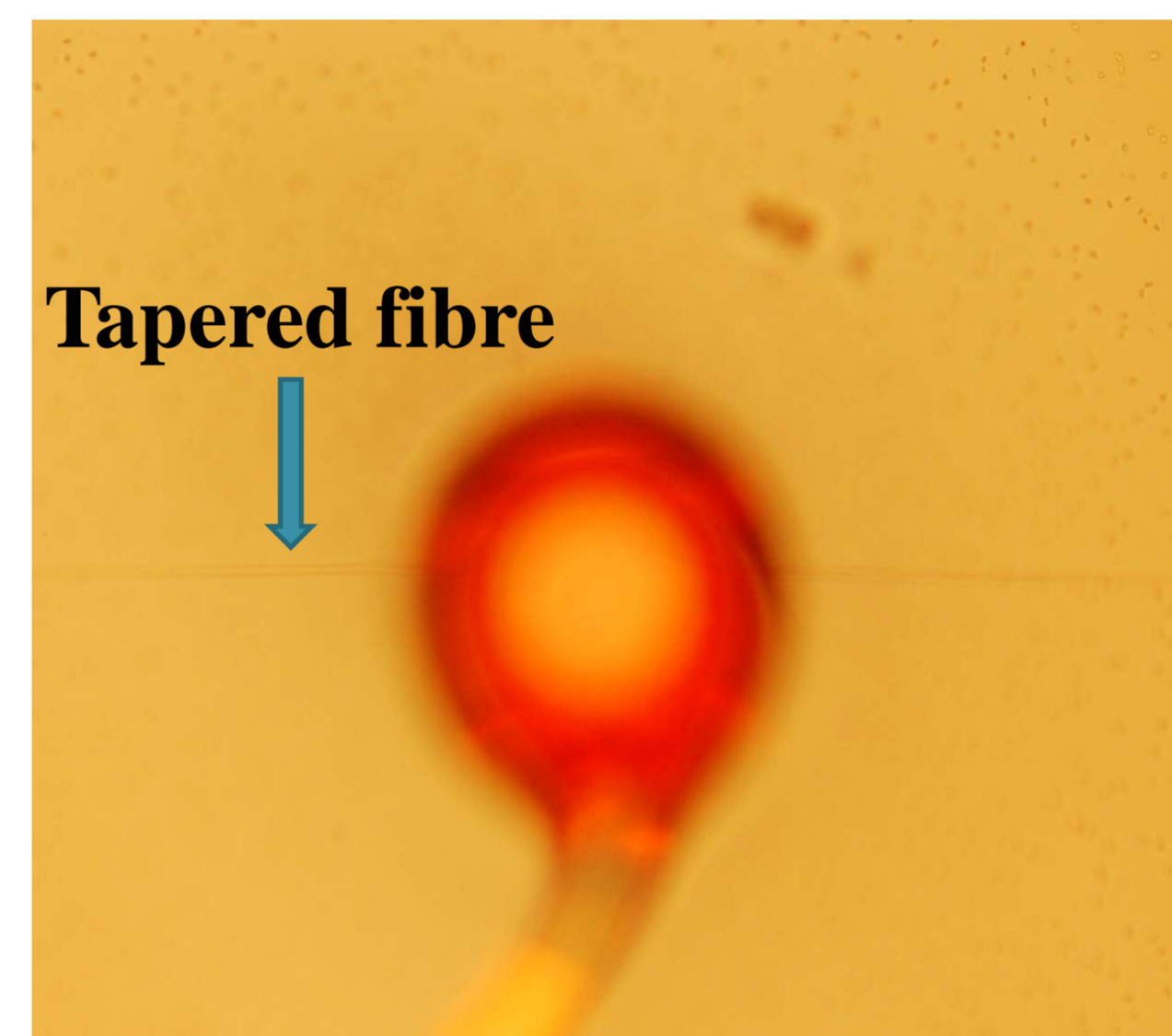


Output spectra from the through and the drop ports

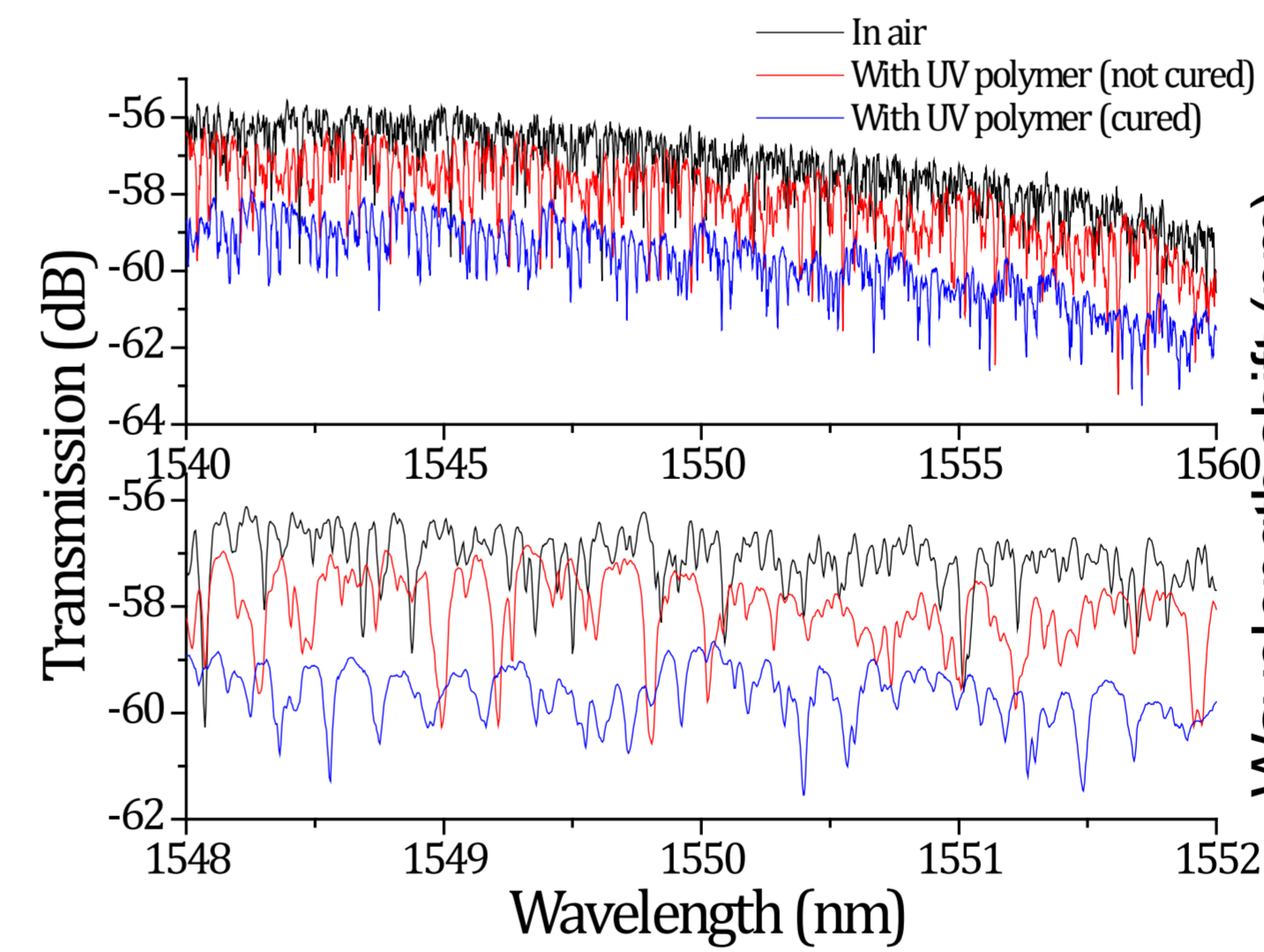


Temperature dependence

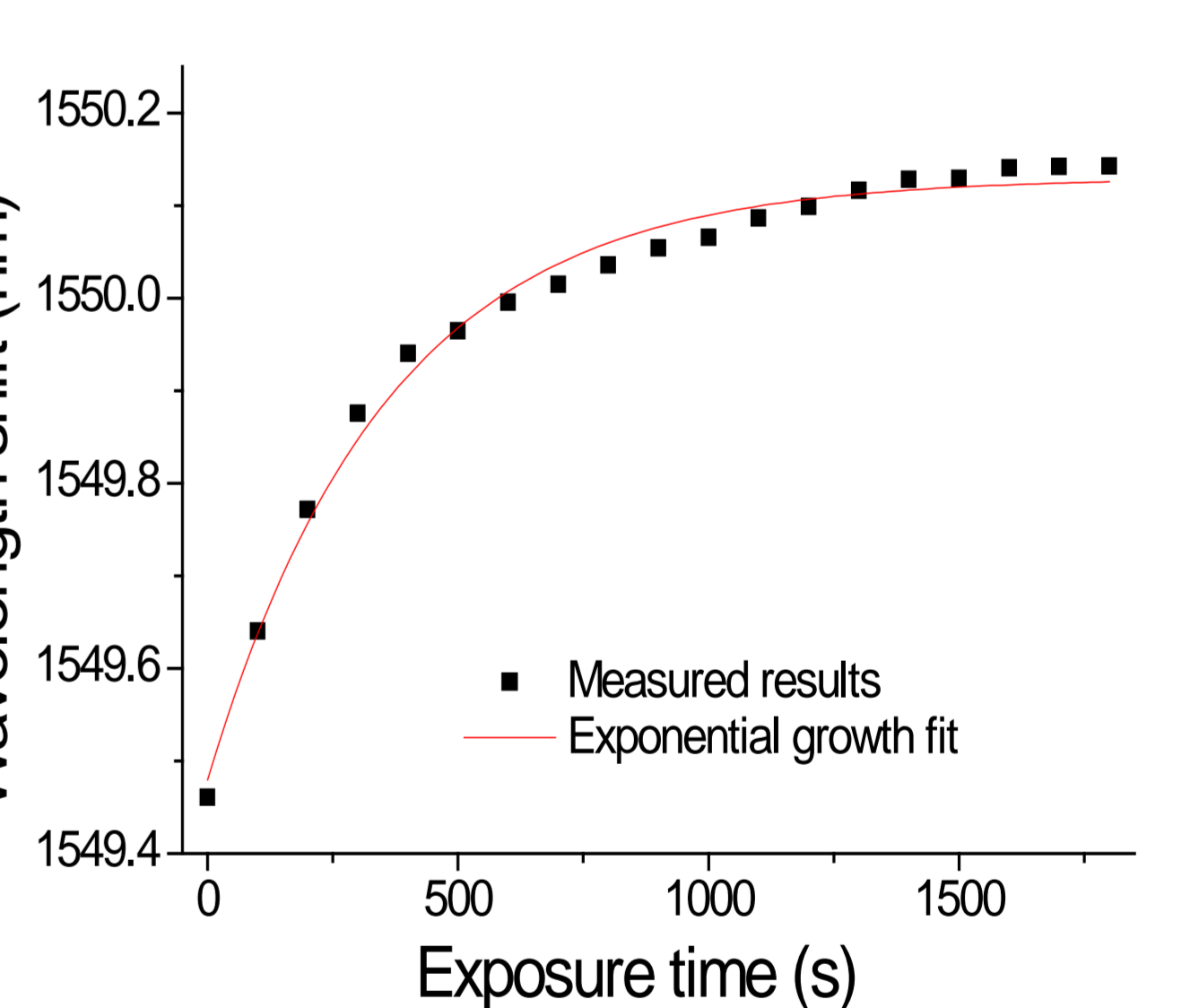
## Packaged chalcogenide microsphere



## Packaged chalcogenide microsphere



Transmission spectra over the wavelength ranges 1540-1560 nm



Peak shift as a function of exposure time

## Conclusion

- A compact packaged silica microsphere based add-drop filter with a Q-factor of  $0.9 \times 10^5$  has been presented.
- The transmission spectral responses of the add and drop channels demonstrate the add-drop potential of the filter for very closely spaced DWDM channels.
- The photosensitivity of the packaged chalcogenide microsphere device with a Q-factor of  $1.8 \times 10^5$  to a 405 nm laser radiation has been presented.
- These two packaged devices are promising candidates for ideal photonic building-blocks for several telecommunication applications including add-drop filters, highly integrated optical switches, modulators, ultra small optical tunable filters and integrated microlasers.

