The micro- control refractive index sensor of dual-metal antiresonance optical fiber

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With the development of artificial intelligence for complex environment monitoring technology, new sensors based on the combination of diversified customized optical fiber waveguides and functional materials have become an important solution to meet the diverse perceptions in complex environments. Then, for solving the concentration monitoring problem of multi-channel microfluidics, the bimetallic antiresonant fiber structure is proposed in this paper, which realize the multi-band microfluidic sensor of bimetallic reverse resonant fiber. Theoretical results show that the sensor achieves the surface plasma resonance (SPR) coupling of the core mode and the metal film at multiple bands of 1450 nm, 1650 nm and 1700 nm, then uses this feature to achieve refractive index sensing in three bands. The corresponding results have potential applications in the field of multimetallic microstructure fiber fluid sensing in the air core, and provide new ideas for the design of multi-band SPR resonance sensors, which are expected to be applied in the field of biochemical monitoring.

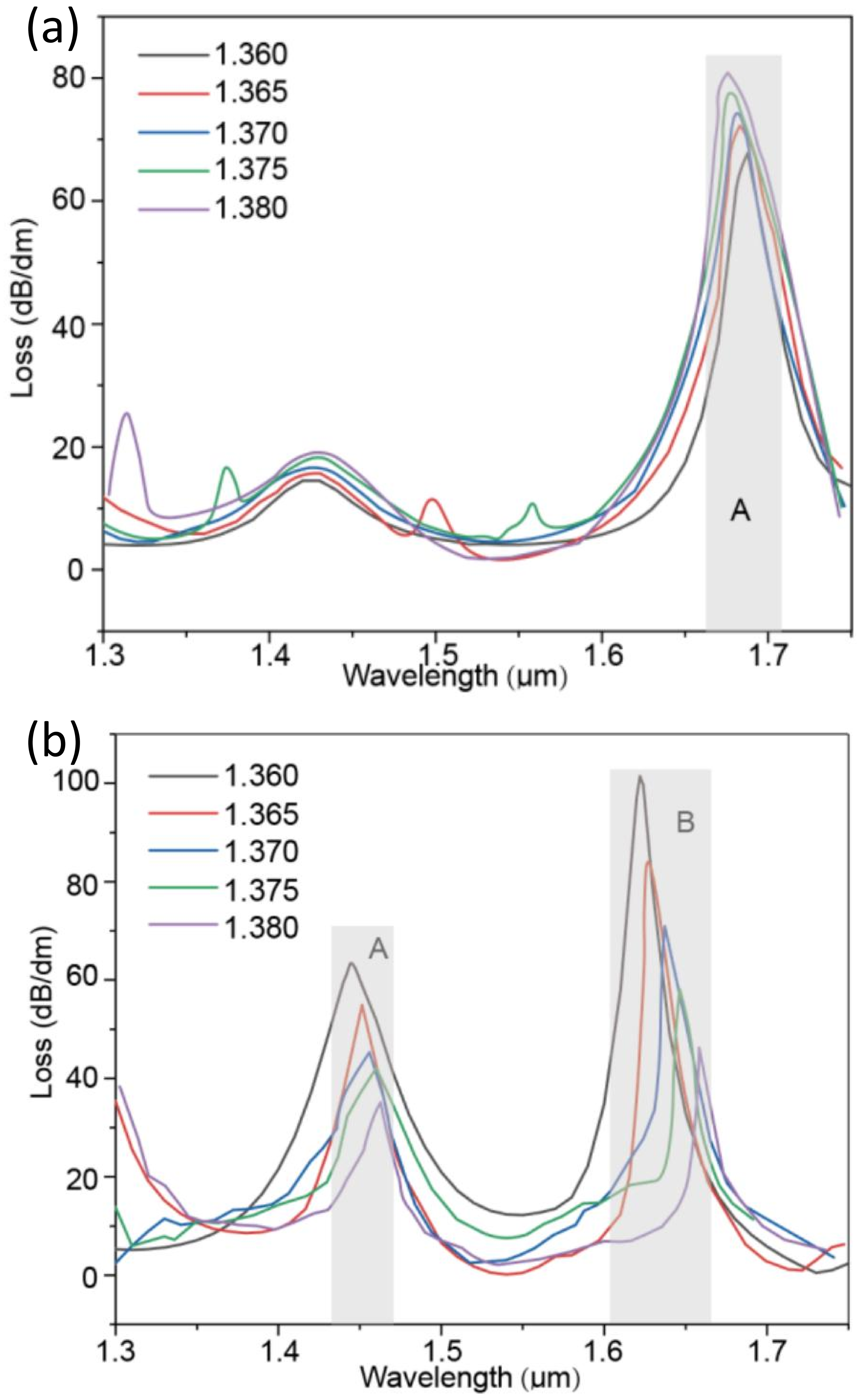
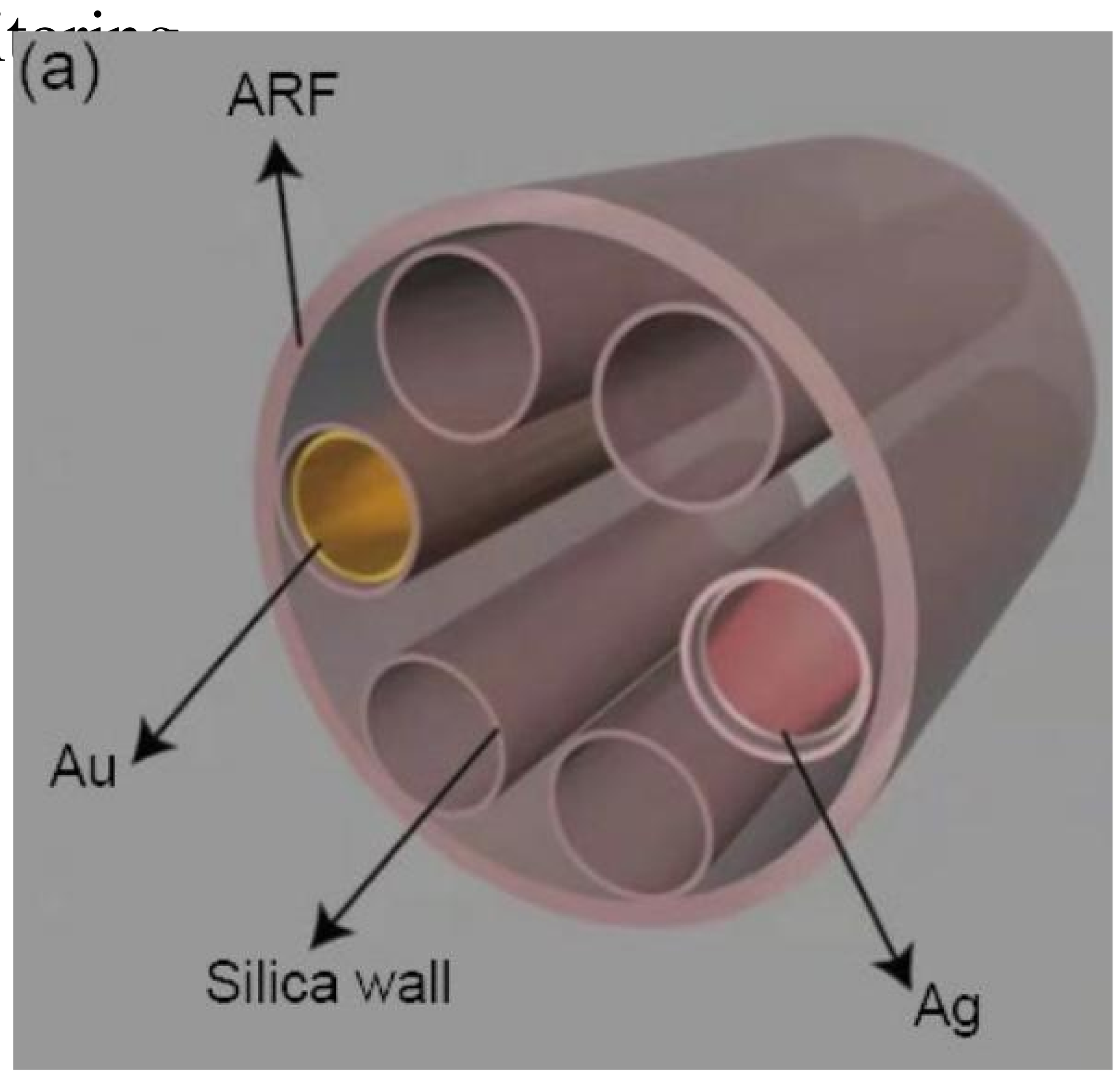


Fig. 2. The design of the fiber optic sensor and performance. (a) 3D schematic diagram. (b) Resonance wavelength variation of the x-polarized core mode.



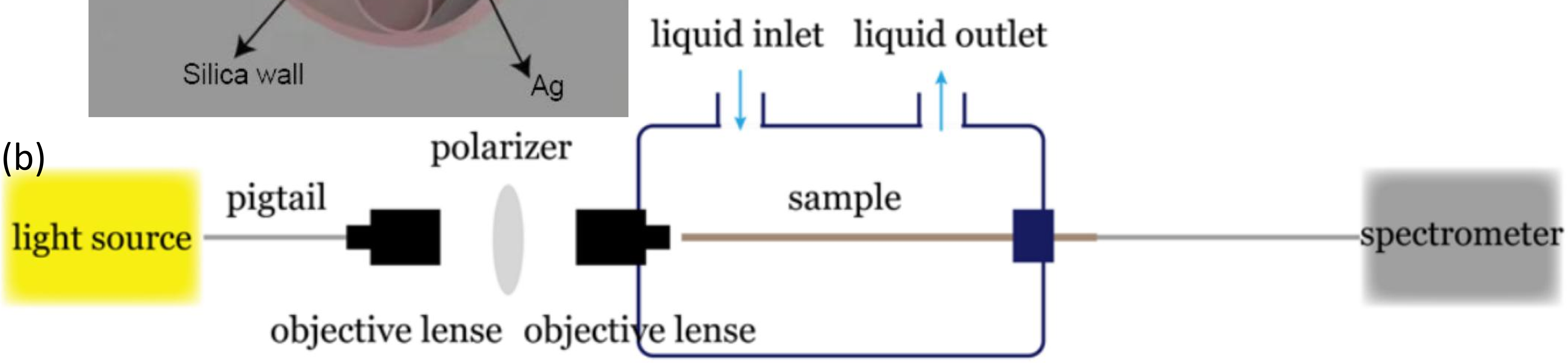


Fig. 1. Sensor design and detection system. (a) 3D schematic diagram. (b) In order to achieve on-line monitoring of the refractive index of the fluid, a chamber is designed in which the fluid is injected through the left-hand opening at the top of the chamber and pumped out through the right-hand opening to form a liquid chamber so that the experimental fluid can be manipulated. After the light wave has passed through the pigtail, the point light source is collimated and expanded through the objective lens, and the expanded light source is incident on the placed polarizer, then the polarizer is adjusted so that the required polarized light is incident on the focusing objective lens, which is focused through the objective lens into the designed bimetallic anti-resonant fiber, and then the signal is transmitted through the single mode fiber into the spectrometer, thus enabling the designed device to monitor the refractive index of fluid in practice. This enables the device to be used in practical fluid refractive index monitoring applications.