

CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

TiO₂ nanofibers were successfully fabricated via electrospinning process. Mixtures of titanium isopropoxide, 2-butanone, polyvinylpyrrolidone, *N,N'*-dimethylformamide, and ethanol were prepared as electrospinning solution of TiO₂ nanofibers. Then, electrospun TiO₂ nanofibers were hot-pressed and followed by calcination step. Diameter of nanofibers is 467±138 nm. Hot-pressed electrospun TiO₂ nanofibers have similar morphology to unpressed electrospun TiO₂ nanofibers. Crystal structure of TiO₂ nanofibers in this research is anatase phase along with some rutile phase. Surface area of unpressed and hot-pressed electrospun TiO₂ nanofibers is 41.89 and 55.84 m²/g, respectively. Contact angle measurement exhibited the effect of hot-pressing process to TiO₂ nanofibers which hot-pressed electrospun TiO₂ nanofibers indicated the uniform surface. UV-activated TiO₂ nanofibers show good sensing performance at room temperature. Sensing behavior of gas sensor to acetone, methane, and methanol is the same which decreasing of conductance was observed. Saturation limit of acetone, methane, and methanol was observed at 14, 10, and 12 mmol respectively. Molecular size and steps of sensing reaction play important roles that explain the different of sensitivity of various gases. Hence, methane indicated more sensitivity than the others at same content. Furthermore, TiO₂ nanofibers also show good reproducibility. Nevertheless, life time of gas sensor is only 40 days before they deteriorate.

5.2 Suggestion

Problems that can be seen in this research are selectivity and life time. In first case, although methane detection shows good sensitivity, acetone and methanol are also detected. Thus, improvement of the selectivity should be further studied. For the latter case, life time of gas sensor is short. It is possible that Cu electrode is covered from oxide because of high humidity under the detection. Therefore, the selection of electrode that resists to oxide like gold, platinum, brass, or stainless steel is also interested to improve life time of gas sensor.