

BAB V

KESIMPULAN DAN SARAN

5.1 Kesimpulan

1. Performa katalis dapat diurutkan berdasarkan *power density* per mg Pt @0,6 V: PtNi NW/C; Pt NW/C; PtNi NP/C; dan GDE Pt/C komersial.
2. Katalis PtNi NW/C merupakan katalis katoda terbaik berdasarkan performa pengujian *single cell* @0,6 V dengan peningkatan *power density* per mg Pt sebesar 3,91 kali lipat relatif terhadap GDE Pt/C komersial.
3. *Alloying* platinum dengan nikel rasio teoritis 3:1 memberikan peningkatan *power density* per mg Pt sebesar 2,56 kali lipat @0,6 V.
4. Performa katalis PtNi NP/C rendah karena banyaknya nikel pada permukaan katalis.
5. Pengaruh efek *alloying* katalis PtNi NW/C pada performa sepenuhnya berasal dari efek elektronik/*ligand*.
6. Morfologi *nanowire* memberikan peningkatan *power density* per mg Pt sebesar 1,53 kali @0,6 V.
7. *Alloying* platinum dengan nikel menunjukkan peningkatan aktivitas secara intrinsik dinilai dari *exchange current density*.
8. Pada kondisi OCV, katalis katoda Pt NW/C memperlihatkan performa terbaik berdasarkan pengujian EIS.

5.2 Saran

1. Hasil TGA kurang meyakinkan, diperlukan pengujian ulang dengan laju aliran gas yang lebih rendah dan proses kalibrasi alat yang optimal.
2. Karakterisasi tambahan perlu dilakukan, seperti pengujian ICP-MS (*Inductively Coupled Plasma - Mass Spectrometry*) atau XRF (*X-Ray Fluorescence*) untuk mengetahui komposisi katalis, dan pengujian HR-TEM (*High Resolution-Transmission Electron Microscopy*) untuk melihat morfologi katalis.
3. Tahap aktivasi MEA belum optimal, performa setiap sampel belum maksimal. Durasi tahap aktivasi disarankan ditambah., dan/atau mengaplikasikan metode *preconditioning*..
4. Diperlukan pengukuran hidrogen *crossover* secara langsung di laboratorium untuk mengurangi parameter persamaan.

5. Diperlukan pengukuran EIS pada voltase yang berbeda, terutama pada voltase 0,6 V yang dijadikan acuan performa sel.
6. Diperlukan pengujian *cyclic voltammetry* untuk mendapatkan nilai ECSA yang diperlukan untuk menormalisasikan hasil pengukuran dan untuk mendapatkan informasi penting lainnya mengenai katalis yang diuji.
7. Diperlukan pengujian *accelerated durability testing* untuk mengetahui durabilitas katalis, karena salah satu kelebihan morfologi *nanowire* adalah durabilitasnya.
8. Tahap *acid treatment* perlu dioptimalkan.

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