

## BAB 5

### KESIMPULAN DAN SARAN

#### 5.1 Kesimpulan

Berdasarkan hasil penelitian yang telah dibahas, dapat diambil beberapa kesimpulan sebagai berikut:

1. Pencampuran pati dengan massa urea yang lebih banyak menyebabkan penurunan perolehan *hydrochar* baik untuk metode dengan pengadukan dan tanpa pengadukan. Perolehan *hydrochar* tanpa pengadukan diperoleh 36,85% (NHCT-10) dan 35,93% (NHCT-20), sedangkan dengan pengadukan diperoleh 39,00% (NHCP-10) dan 34,44% (NHCP-20).
2. Dengan analisis SEM, diketahui bahwa sampel tersusun secara acak dan berbentuk kasar yang disebabkan adanya *defect* dari hasil doping nitrogen.
3. Dengan analisis EDS, diketahui bahwa *N-doping* berhasil pada setiap sampel dengan kandungan nitrogen paling banyak pada sampel tanpa pengadukan dengan persentase 2,53% (NHCT-10) dan 3,67% (NHCT-20)
4. Dengan analisis XRD, diketahui tiap sampel memiliki sifat amorf yang lebih besar dibandingkan sifat kristalinitasnya. Persentase amorf terbesar pada sampel dengan adanya pengadukan yaitu NHCP-10 dan NHCP-20 dengan persentase berturut-turut adalah 69,33% dan 71,24%
5. Dari grafik XRD juga menunjukkan bahwa *N-doped hard carbon* memiliki rentang jarak interlayer sebesar 0,348 – 0,449 nm.

#### 5.2 Saran

Berdasarkan penelitian yang telah dilakukan, terdapat beberapa saran yang dapat dipertimbangkan sebagai berikut.

1. Perlu melakukan studi lebih lanjut mengenai metode doping nitrogen untuk penambahan unsur yang lebih efektif.
2. Analisis SEM-EDS dan XRD untuk pati yang telah dicampurkan dengan senyawa doping dan sampel *hydrochar*. Selain itu, produk *N-doped hard carbon* dapat juga dilakukan analisis dengan XPS untuk mengidentifikasi komposisi yang terkandung secara akurat.

3. Pengujian sampel *N-doped hard carbon* terhadap peforma elektrokimianya sebagai material anoda baterai sodium.

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