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**Feasibility of using a rotating packed bed with blade packings to produce ZnO nanoparticles**Chia-Chang Lin <sup>a,b,\*</sup>, Chun-Jie Lin <sup>a</sup>

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**Abstract**

A rotating packed bed (RPB) with blade packings was used to produce zinc oxide (ZnO) nanoparticles by precipitation. Precursors were firstly produced in a continuous liquid-liquid reaction of zinc chloride ( $\text{ZnCl}_2$ ) with sodium hydroxide (NaOH). The effects of the concentrations of  $\text{ZnCl}_2$  and NaOH, the flow rates of aqueous  $\text{ZnCl}_2$  and NaOH, and the rotational speed on the size of the precursors were studied. Experimental results indicate that increasing concentrations of  $\text{ZnCl}_2$  and NaOH, decreasing flow rates of aqueous  $\text{ZnCl}_2$  and NaOH, and decreasing the rotational speed reduced the size of the precursors. The smallest precursors were produced at a  $\text{ZnCl}_2$  concentration of 0.4 mol/L, an NaOH concentration of 0.8 mol/L, flow rates of aqueous  $\text{ZnCl}_2$  and NaOH of 0.3 L/min, and a rotational speed of 600 rpm. Then, the precursors were calcined at 400°C for 1 h to generate ZnO nanoparticles with a mean size of 43 nm and a narrow size distribution. The detailed characterizations revealed that the as-produced ZnO nanoparticles were pure ZnO, which comprised a highly crystalline hexagonal wurtzite phase and exhibited a favorable optical property.

**Keywords:** Rotating packed bed; ZnO; Nanoparticles; Precipitation

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