

Low Temperature Synthesis of Micro-sized  $\text{Ni}_x\text{Al}_y$  Alloy Powders for Applications of Catalysis

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Micro-sized  $\text{Ni}_x\text{Al}_y$  alloy powders were synthesized through a low-temperature chemical alloying method using mixtures of Ni and Al powders as well as  $\text{AlCl}_3$  as an activator in a quartz batch reactor at temperatures of 400 to 500 °C without sintering. Five Ni-Al alloy powders,  $\text{Ni}_3\text{Al}$  (Ni-13.3wt%Al),  $\text{Ni}_5\text{Al}_3$  (Ni-21.6wt%Al),  $\text{NiAl}$  (Ni-31.5wt%Al),  $\text{Ni}_2\text{Al}_3$  (Ni-40.8wt%Al), and  $\text{NiAl}_3$  (Ni-58wt%Al), all thermodynamically stable at the aforementioned temperature range, were synthesized without significant changes in morphology, compared to the starting Ni powder. These as-synthesized  $\text{Ni}_x\text{Al}_y$  alloys were characterized using different analytical techniques including particle size analyzer, X-ray diffraction and field emission scanning electron microscopy in conjunction with energy dispersive X-ray spectroscopy to confirm the formation of single phase  $\text{Ni}_x\text{Al}_y$  alloys powder. These as-synthesized  $\text{Ni}_x\text{Al}_y$  alloy powders will be promising template materials to manufacture nickel skeletal catalysts with high surface area for different chemical reactions.