# Unveiling the role of Ni doping in the electrochemical performance improvement of the LiMn2O4 cathodes

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## Data:

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| Sample | Initial Discharge Capacity (mAh/g) | Capacity Retention after 1000 cycles (%) | Rate Capability at 15 C (mAh/g) | Li Diffusion Coefficient (cm²/s) | Reference |
| LiMn2O4 | 43.65 | 48.11 | N/A | 4.89 × 10⁻¹⁵ | Xu et al., 2023 |
| LiNi0.02Mn1.98O4 | 73.27 | 74.44 | N/A | N/A | Xu et al., 2023 |
| LiNi0.05Mn1.95O4 | 82.07 | 88.92 | 58.27 | 2.26 × 10⁻¹⁴ | Xu et al., 2023 |
| LiNi0.1Mn1.9O4 | 68.91 | 88.59 | N/A | N/A | Xu et al., 2023 |
| LiMn2O4 (cited) | 50-80 | 60-70 | N/A | N/A | Zhang et al., 2023 |

## Insight:

Enhanced Stability: Ni doping significantly enhances the cycling stability of LiMn2O4 cathodes, with the LiNi0.05Mn1.95O4 sample showing an 88.92% capacity retention after 1000 cycles compared to 48.11% for undoped LiMn2O4.

Improved Rate Capability: The LiNi0.05Mn1.95O4 sample exhibits superior rate capability, delivering 58.27 mAh/g at 15 C, indicating better performance under high-rate conditions.

Increased Li Diffusion: The Li diffusion coefficient of LiNi0.05Mn1.95O4 is significantly higher (2.26 × 10⁻¹⁴ cm²/s) compared to undoped LiMn2O4 (4.89 × 10⁻¹⁵ cm²/s), suggesting that Ni doping facilitates faster Li ion transport.

## Best sample:

LiNi0.05Mn1.95O4

## Reason:

The LiNi0.05Mn1.95O4 sample is selected as the best due to its highest capacity retention (88.92%) after 1000 cycles, superior rate capability (58.27 mAh/g at 15 C), and enhanced Li diffusion coefficient (2.26 × 10⁻¹⁴ cm²/s), which collectively indicate excellent long-term stability, high performance under high-rate conditions, and efficient Li ion transport.