**Supplementary Information**

**Synthesis of Cu-Al layered double hydroxides from aluminum saline slags**

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**Table S1**. Thermogravimetric parameters of the synthesized CA9X sample.

|  |  |  |  |
| --- | --- | --- | --- |
| I | II | III | IV |
| Temperature  Sample | 40-160 oC | 160-210 oC | 210-570 oC | 570-700 oC | **Total weight loss (%)** |
| CA9X | 2.77% | 9.39 % | 12.55% | 2.29% | 27 |

**Table S2**. Reducibility degree obtained from H2-TPR profile CCA9X sample synthesized at pH = 9.

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| --- | --- | --- |
| Peak | Area  (%) | Temperature  (°C) |
|  | **CCA9X** |  |
| α | 29.1 | 205 |
| α´ | 43.26 | 258 |
| β | 27.63 | 295 |

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| **Figure S1.** Powder X-ray diffraction diagrams (PXRD). **(A)** uncalcined CA9X sample. The crystal patterns of copper oxide (JCPDS 48-1548) and copper hydroxide carbonate (JSPD 01-072-0075) correspond to ,  respectively. Monoclinic copper Aluminum Carbonate Hydroxide Hydrate, red bands (JCPDS 46-0099). **(B)** calcined CCA9X sample at 400oC (LDO). Crystal patterns of copper oxide tenorite in blue lines (JCPDS 48-1548). |

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| **Figure S2**. Powder X-ray diffraction (PXRD) patterns of LDO at various calcination temperatures. 400CCA9, 650CCA9, 850CCA9, 950CCA9 for temperatures 400, 650, 850 and 950 °C, respectively. CuO tenorite (solid red lines ((JCPDS 48-1548)), CuAl2O4 (solid black lines (JCPDS 33-0448) and CuAlO2 (solid blue lines (JCPDS 40-1037)). |

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| **Figure S3.** Hysteresis loopof **(A)** uncalcined and **(B)** calcined samples. |



**Figure S4**. TGA – DTG profiles of CuAl LDH synthesized at pH = 9 using Al(NO3)3, CA9X sample.



**Figure S5.** TPR patterns of the CCA9X calcined at 400 ℃ (LDO) and peak deconvolution.