SUPPORTING INFORMATION

Zinc(II), cobalt(II) and manganese(II) networks with phosphoserine ligand: Synthesis, crystal structures magnetic and proton conductivity properties

Julia Vallejo,[1] Inés R. Salcedo,[2] Rosario M. P. Colodrero,[2] Aurelio Cabeza,[2] Anna Świtlicka,[3] Joan Cano,[1] and Marta Viciano-Chumillas[1,]*

[1]Institut de Ciència Molecular (ICMol), Universitat de València, 46980 Paterna, València

[2]Departamento de Química Inorgánica, Cristalografía y Mineralogía, Universidad de Málaga, Campus de Teatinos s/n, Málaga-29071, Spain

[3]Department of Crystallography, Institute of Chemistry, University of Silesia, 9th Szkolna St., 40-006 Katowice, Poland

LIST OF CONTENTS

FIGURES

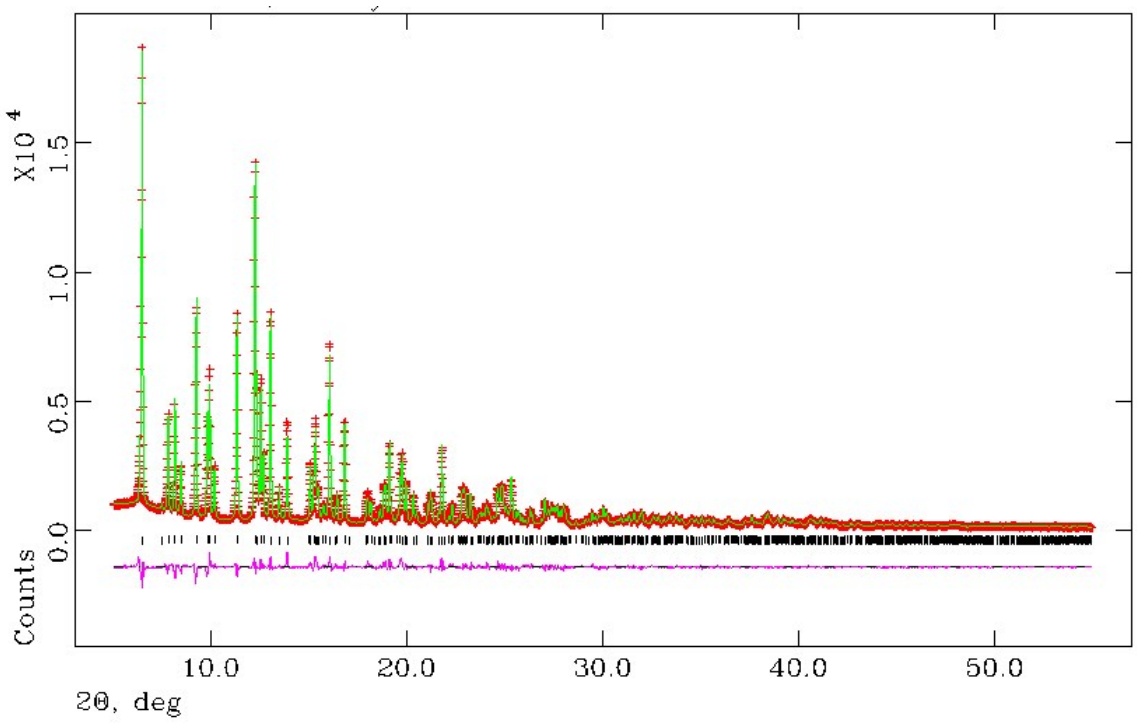

Figure S1. Rietveld plot for $[Mn(Pser)(H_2O)]_n$ (**4**) (Mo $K_{\alpha 1}$ radiation).

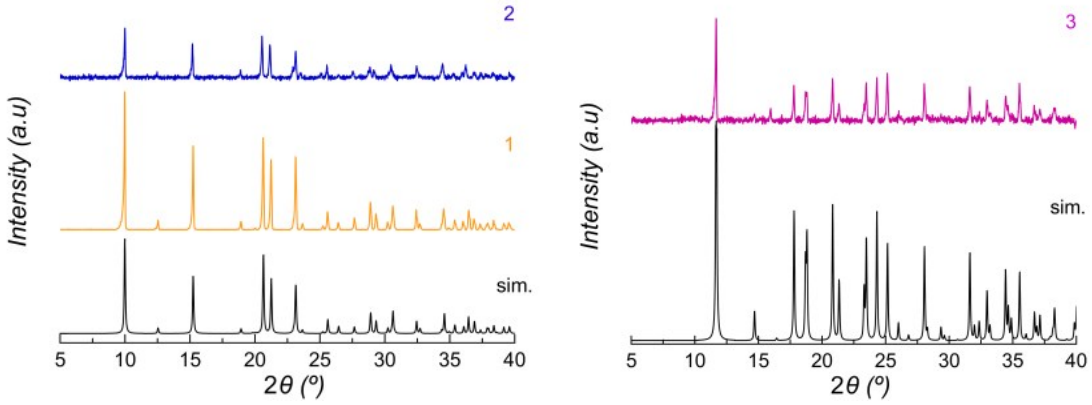

Figure S2. Simulated (black) and experimental X-ray powder diffraction patterns for compounds **1** (orange), **2** (blue) and **3** (magenta).

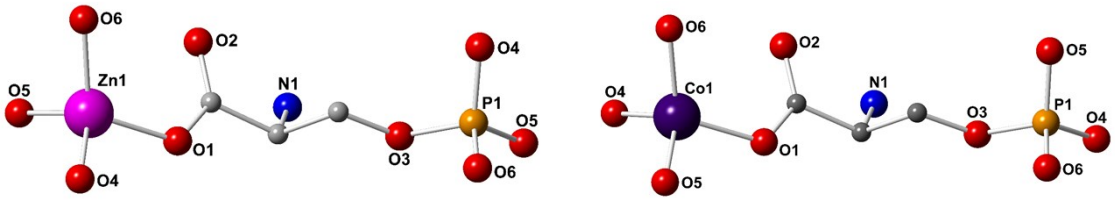

Figure S3. Tetrahedral coordination of M^{2+} (Zn and Co) and the connectivity of phosphoserine ligand in the crystal structures of $[Zn(HPser)]_n$ (**1**) (left) and $[Co(HPser)]_n$ (**2**) (right). Hydrogen atoms are omitted for clarity. Colour code: magenta, zinc; violet, cobalt; orange, phosphorous; blue, nitrogen; red, oxygen; grey, carbon.

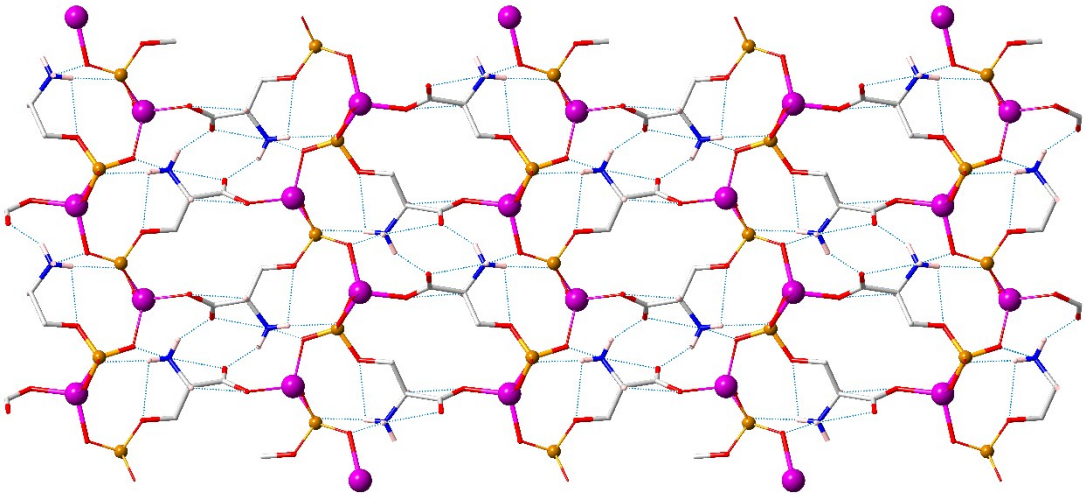

Figure S4. View of the hydrogen bonding in the *a*-axis direction in compound $[Zn(HPser)]_n$ (**1**). Hydrogen atoms that are not involved in hydrogen bonds are omitted for clarity. Colour code: magenta, zinc; orange, phosphorous; blue, nitrogen; red, oxygen; grey, carbon.

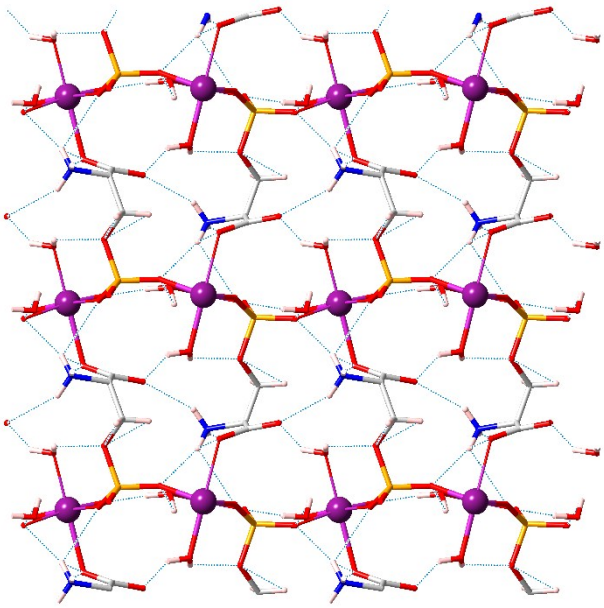

Figure S5. View of the hydrogen bonding in the *a*-axis direction of compound $[Co(HPser)(H_2O)_2]_n$ (**3**). Hydrogen atoms that are not involved in hydrogen bonds are omitted for clarity. Colour code: magenta, cobalt; yellow, phosphorous; blue, nitrogen; red, oxygen; grey, carbon; pink, hydrogen.

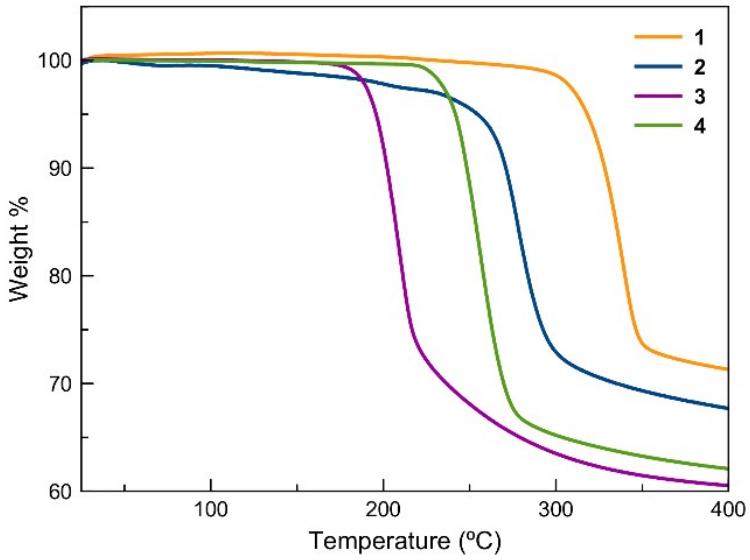

Figure S6. Thermogravimetric analyses of compounds **1**−**4**.

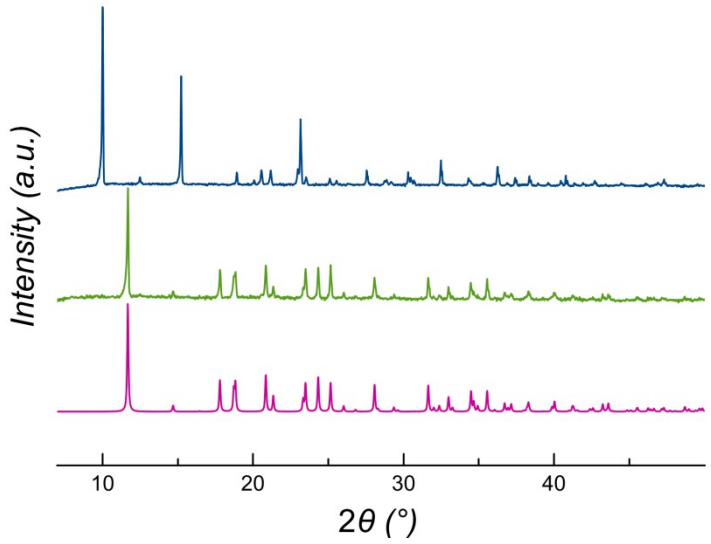

Figure S7. X-ray powder diffraction patterns for compounds **2** as synthesized (blue line), after exposure at 80 ºC and RH 95% (green line) and for **3** (magenta line).

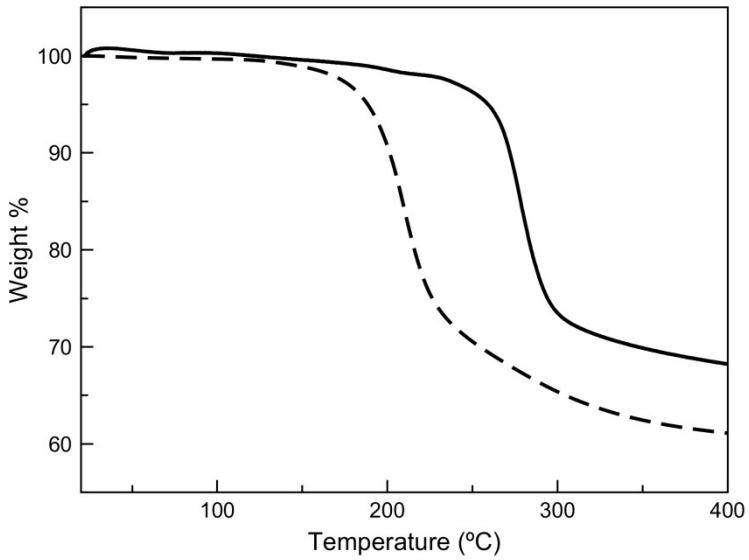

Figure S8. Thermogravimetric analysis of **2** as synthesized (black line) and after exposure at 80 ºC and RH 95% (dash line).

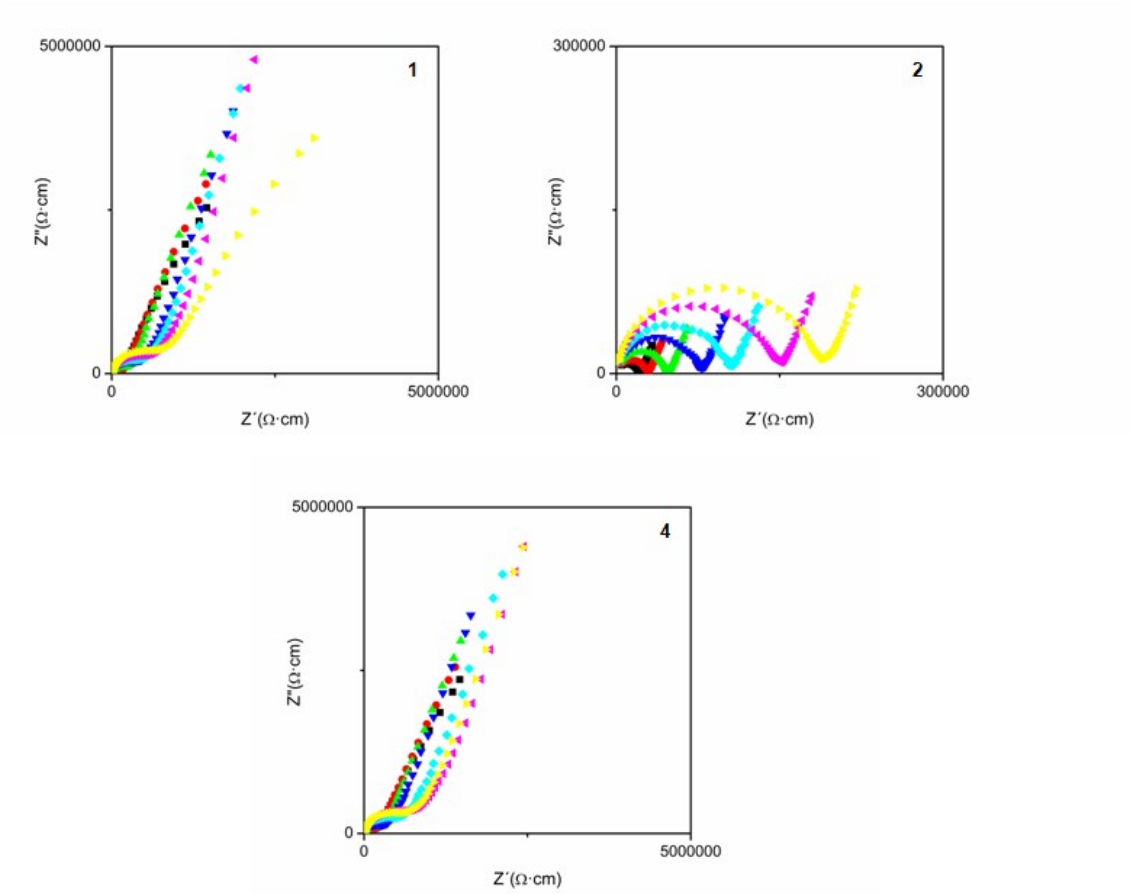

Figure S9. Plot of complex impedance plane for $[Zn(HPser)]_n$ (**1**), $[Co(HPser)]_n$ (**2**) and $[Mn(HPser)(H_2O)]_n$ (**4**). All compounds were measured at 95% of RH and at seven temperatures, 80 (black), 70 (red), 60 (green), 50 (blue), 40 (light blue), 30 (magenta) and 25 ºC (yellow).

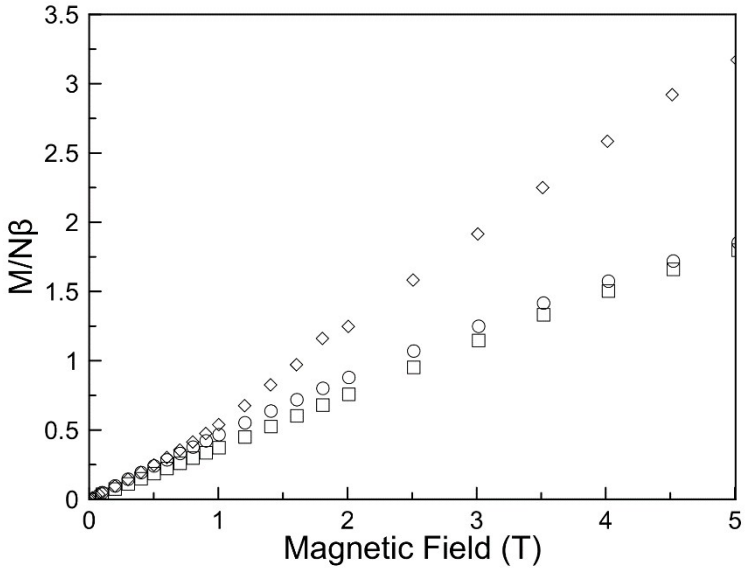

Figure S10. Plot of the magnetization *vs* magnetic field in the 0−5 T range at 2 K for compounds **2** (○), **3** (□), and **4** (❋).

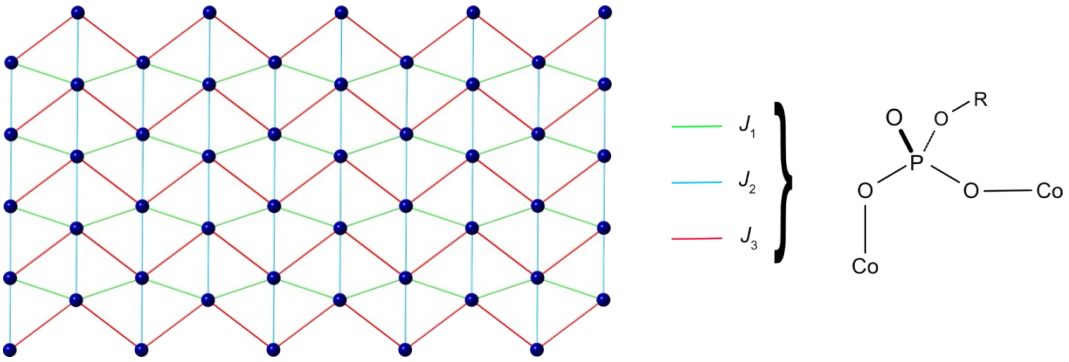

Figure S11. Representation of the magnetic network for compound **3** where the cobalt(II) ions are the blue balls and the magnetic exchange couplings are represented by colour lines (see Table 4).

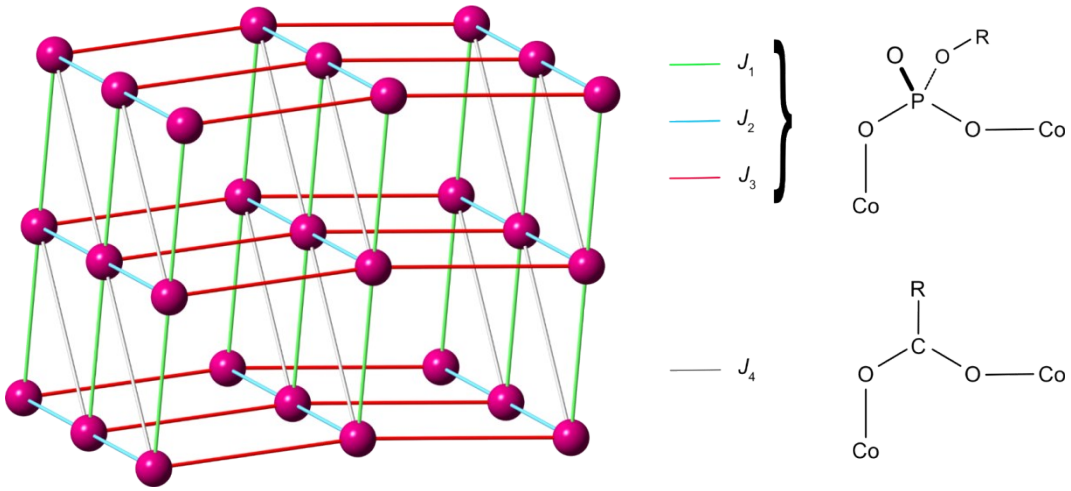

Figure S12. Representation of the magnetic network for compound **4** where the manganese(II) ions are the magenta balls and the magnetic exchange couplings are represented by colour lines (see Table 4).