## Supporting Information for:

Syntheses and structures of some complexes $\left[\left\{\mathbf{M}_{\mathbf{3}}(\mu-\mathrm{dppm})_{3}\right\}\{\mu\right.$ -
$\left.\left.\mathbf{C} \equiv \mathbf{C C} \equiv \mathbf{C}\left[M^{\prime} \mathbf{L}_{\mathbf{x}}\right]\right\}_{\mathrm{n}}\right]^{(3-\mathrm{n})+} \mathbf{X}_{(3-\mathrm{n})}^{-}\left[\mathrm{M}^{\prime} \mathbf{L}_{\mathbf{x}}=\operatorname{Re}(\mathbf{C O})_{3}\left(\mathrm{Bu}_{2}^{\mathrm{t}}-\mathrm{bpy}\right), \operatorname{Ru}(\mathbf{d p p e}) \mathbf{C p}{ }^{*} ;\right.$
$\left.\mathbf{d p p m}=\mathbf{C H}_{2}\left(\mathbf{P P h}_{2}\right)_{2} ; \mathbf{X}=\mathbf{P F}_{6}, \mathrm{BF}_{4} ; \mathbf{n}=\mathbf{1}, 2\right]$ and $\left[\mathrm{Ag}_{6}(\mu-\right.$
$\left.\mathrm{dppm})_{4}\left\{\mathrm{C} \equiv \mathrm{CC} \equiv \mathrm{C}\left[\operatorname{Re}(\mathrm{CO})_{3}\left(\mathrm{Bu}^{\mathbf{t}}-\mathrm{bpy}\right)\right]\right\}_{4}\right]\left(\mathrm{PF}_{6}\right)_{2}$

Michael I. Bruce ${ }^{\text {a, }}$, Benjamin G. Ellis ${ }^{\text {a }}$, Jean-François Halet ${ }^{\text {c }}$, Boris Le Guennic ${ }^{\text {c }}$, Brian K. Nicholson ${ }^{\text {d }}$, Hiba Sahnoune ${ }^{\mathrm{c}}$, Nancy Scoleri ${ }^{\mathrm{a}}$, Brian W. Skelton ${ }^{\text {bee }}$, Alexandre N. Sobolev ${ }^{\mathrm{b}}$, Christopher J. Sumby ${ }^{\text {a }}$, Allan H. White ${ }^{\mathrm{b}, \dagger}$, Natasha N. Zaitseva ${ }^{\text {a }}$
${ }^{\text {a }}$ Department of Chemistry, School of Physical Sciences, University of Adelaide, South Australia 5005
${ }^{\mathrm{b}}$ School of Chemistry and Biochemistry, M313, The University of Western Australia, Crawley, Western Australia 6009
${ }^{\text {c }}$ Institut des Sciences Chimiques de Rennes, UMR 6226 CNRS - Université de Rennes 1, F35042 Rennes cedex, France
${ }^{\mathrm{d}}$ Department of Chemistry, University of Waikato, Hamilton, New Zealand
${ }^{\text {e }}$ Current address: Centre for Microscopy, Characterization and Analysis, M010, The University of Western Australia, Crawley, Western Australia 6009, Australia

* Corresponding author: Tel: + 6188313 5939; E-mail: michael.bruce@adelaide.edu.au
$\dagger$ Deceased 26 Mar 2016


Figure S1. A representation of the molecular structure of $\left[\mathrm{Cu}_{3}(\mu-\right.$ $\mathrm{dppm})_{3}\left\{\mathrm{C} \equiv \mathrm{CC} \equiv \mathrm{C}\left[\mathrm{Ru}(\mathrm{dppe}) \mathrm{Cp}^{*}\right\}\right]\left(\mathrm{BF}_{4}\right)_{2}[6]\left(\mathrm{BF}_{4}\right)_{2}$. Ellipsoids have been drawn at the $50 \%$ probability level, the anions, hydrogen atoms and the phenyl carbons of the dppm ligands (except the ipso-carbons) omitted for clarity.


Figure S2. Representations of the molecular structures of the (a) acetone and (b) THF solvates of $\left[\mathrm{Ag}_{3}(\mu-\mathrm{dppm})_{3}\left\{\mathrm{C} \equiv \mathrm{CC} \equiv \mathrm{C}\left[\mathrm{Ru}(\mathrm{dppe}) \mathrm{Cp}^{*}\right\}\right]\left(\mathrm{BF}_{4}\right)_{2} \cdot \mathrm{Me}_{2} \mathrm{CO} \quad[8]\left(\mathrm{BF}_{4}\right)_{2}\right.$. Ellipsoids have been drawn at the $50 \%$ probability level with solvate molecules, the anion, hydrogen atoms and the phenyl carbons of the dppm ligands (except the ipso-carbons) omitted for clarity.


Figure S3. (a) A representation of the molecular structure of $\left[\mathrm{Ag}_{6}(\mathrm{dppm})_{4}\left\{\mathrm{C} \equiv \mathrm{CC} \equiv \mathrm{C}\left[\operatorname{Re}(\mathrm{CO})_{3}\left(\mathrm{Bu}_{2}^{\mathrm{t}}-\mathrm{bpy}\right)\right\}_{4}\right]\left(\mathrm{PF}_{6}\right)_{2}[\mathbf{1 2}]\left(\mathrm{PF}_{6}\right)_{2}\right.$. Ellipsoids have been drawn at the $50 \%$ probability level with solvate molecules, the anion, hydrogen atoms and the phenyl carbons of the dppm ligands (except the ipso-carbons) omitted for clarity. (b) A second view of the structure highlighting the cluster connectivity (ball and stick representation).

