Preface

"Everything has its beauty but not everyone sees it"

Confucius, Analects, *ca.* 500BC

Gold is an element that has fascinated mankind for millennia. It is viewed as immutable, non-changing, the ultimate statement of wealth and beauty. Gold has been used by jewellers to create some of the most beautiful artefacts throughout history. Gold is invariably the metal selected by most couples as the outward sign of their love. The constancy of gold is born out of its chemical inertness when in a bulk form as it does not react with air and corrode. Gold has been a source of conflict, and it has also been fought over for millennia. Gold has been viewed as so important that alchemists tried to make it from less valuable base metals. Indeed, some of the most noted scientists in the seventeenth century formed a group called 'the mercuralists' who contended that gold was a particular combination of mercury and sulfur. However, for most people, the outward sign of beauty is obvious for gold, so why have I selected a relatively obscure quotation from Confucius for this Preface to a book on the topic of Catalysis by Gold. By the time you have finished the book, I hope you will have appreciated the statement. Gold has a hidden inner beauty for a scientist interested in catalysis, for it turns out that, when this immutable, lustrous metal is subdivided down to the nanoscale, it becomes an incredibly reactive material. In a nanocrystalline state, gold can activate carbon monoxide and dioxygen at temperatures as low as 197 K to form carbon dioxide. Such levels of activity are not replicated by other catalysts. It is an amazing discovery that gold is an active redox catalyst. Indeed, it can be the catalyst of choice. This hidden beauty had lain dormant for centuries, even though the catalytic activity of other nano-divided metals had been established. For example, Faraday demonstrated the catalytic activity of finely divided platinum for hydrogen reactions in the first half of the nineteenth century. Now the topic of catalysis by gold represents one of the fastest growing fields in science. Hundreds of scientific papers are appearing on the topic annually and the

rate of growth of scientific discovery for catalysis by gold is currently exponential. New discoveries, particularly relating to the selective oxidation of alkenes, alcohols and even alkanes are being made with incredible speed. Against this background, it is timely that the authors have written a book bringing together these myriad of themes of catalysis by gold. It is a rich story and it is well told, it is a story you will enjoy reading.

Graham J. Hutchings
May 2006