Editorial

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This issue of *Resonance* honours Professor Cyril Stanley Smith, a Renaissance metallurgist of the twentieth century. C S Smith bridged the two cultures of art and technology in an effortless fashion. His life from 1903 to 1992 spanned practically the entire century. Though he was trained as a metallurgist at Birmingham and Boston, Smith was more than a mere metal smith. His work transcended the practical aspects of metalworking and extended to establishing the links between science, technology and art on a grand canvas. His research illumined the historical development of metallurgy over a hundred centuries. His quest was driven by the aesthetic impulse more than any other. He was a polymath in every sense of the word and can rightfully claim the legacy of Leonardo da Vinci.

As captured in the succinct biographical sketch by Robert Cahn, Smith's lifeline holds several object lessons for the young readers of *Resonance*. His professional life was spent at four locations – Connecticut, New Mexico, Chicago and Boston. His preoccupations were completely different in these four places. He developed an early interest in the history of metals, a passion he was to indulge in greater measure in Chicago and Boston. A chance meeting with Robert Oppenheimer in a park led to his tryst with destiny. The three years that he spent at Los Alamos as the Chief Metallurgist at the Manhattan Project, amidst the captivating landscape of New Mexico, were the most exciting in his whole life. He was a pioneer in Nuclear Metallurgy and made ductile plutonium-gallium alloys long before the phase diagram was established. In their article 'Dr Smith goes to Los Alamos', S G Srinivasan, and colleagues narrate this adventure.

When the Manhattan Project was dismantled on August 9, 1945 – Nagasaki day – the US Government established two Institutes at the University of Chicago devoted to the study of nuclear physics and metals. Smith was the first Director of the Institute for the Study of Metals. He blazed new trails in linking metals to nonmetallic materials and laid the foundations for modern materials science. Using simple but elegant principles of geometry drawn from the work of the mathematician Leonhard Euler and drawing analogies with soap bubbles, he pioneered stereological methods and inspired succeeding generations. The

conjecture of the Belgian physicist Joseph Plateau that soap films meet along triple lines and quadruple points was solved in a brilliant fashion by the mathematician Jean Taylor. In her article, she traces the influence of Prof Smith on her work. Denis Weaire explores C S Smith's experiments in 2D soap froth and also dwells on the viewpoint of complexity developed by C S Smith. In an article published in the journal *Leonardo*, Smith drew attention to a special class of tiling involving only two tiles. Named after the Dominican priest, Sebastian Truchet, these tilings are covered in an article by Eric Lord and S Ranganathan.

As Institute Professor at MIT from 1961 to 1992, he was free to pursue the connections between aesthetics of art forms and technology and became the most eloquent expositor of contributions to art and science from the Orient. He was a pioneer in the application of metallography to the study of archaeological artifacts and founded the discipline of archaeometallurgy. The articles by Samuel Allen, Heather Lechtman and Martha Goodway describe his move from Chicago to Boston, his research concerning the prehistory of the solid state and his prodigious efforts in the translation of ancient metallurgical texts.

The Golden Jubilee of the oldest Indian metallurgy department brought Smith to India in December 1973. His papers on wootz steel identifying it as one of the four outstanding achievements of metallurgical antiquity brought fame to the ancient metallurgical prowess of India. This aspect is covered in an article by S Ranganathan and Sharada Srinivasan. The Classics pages are taken from his collection of essays – *A Search for Structure*. It is hoped that the young readers of this journal will have their horizons widened and they will follow the suggested reading further to experience the unity of art, science, technology and history.

Leonardo da Vinci – The Quintessential Renaissance Man

The Renaissance era was marked by an excitement for integrated knowledge in science and art. The civic pride of the growing city-states in Europe was involved in supporting art and performance and practical projects that required the skills of architects and military engineers. Artists, engineers, and scientists were all interested in each other's activities. The stellar example of the Renaissance Man was the Italian Leonardo da Vinci (1452-1519) a man well beyond his time. He was a renaissance painter, sculptor, musician, geometer, architect, anatomist, engineer, inventor and philosopher. Leonardo da Vinci is famous for his paintings such as the Mona Lisa with an enigmatic smile and the Last Supper. He conceptualized the helicopter and the tank, the use of concentrated solar power and the calculator. As very few of his designs were constructed during his lifetime and modern scientific approaches to metallurgy and engineering were in their infancy during the Renaissance, his vision becomes all the more remarkable.