Introducing Yves Bréchet

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The Liliane Bettencourt Chair of Technological Innovation is an Annual Chair that was created in 2007 by the Collège de France in collaboration with the Bettencourt Schueller Foundation. I would like to welcome Mrs Bettencourt Meyers and Mr Meyers who are with us today for this inaugural lecture.

Within the framework of this Chair, every year the Collège de France invites a scientific personality to give a series of lectures on a major aspect of technological innovation. This can be the development of new industrial processes based on fundamental research, the transfer of scientific knowledge to industrial applications, or the creation of companies or start-ups to commercialize these applications – to cite but a few examples of the crucial links developed between the elaboration of scientific knowledge and applications which have often revolutionized our everyday lives.

Previous holders of these Annual Chairs have spoken to us about research on medicines, the digital revolution, new medical and industrial diagnostic processes, nanotechnology and biomedical innovations. Today, Yves Bréchet is going to talk to us about the elaboration of materials as an introduction to his lecture series entitled “The Science of Materials: from Materials Discovered by Chance to Customized Materials”. The importance, in our everyday lives, of the new materials that have appeared and been developed for the last century is obvious, be they essential semi-conductors for electronics, optical fibres and glasses, car and aeronautics components, metals used in nuclear plants, and nanometric objects developed for biomedical applications.

Developing a new material involves studying its properties, understanding its structure and developing efficient methods to prepare it. This is a domain where fundamental and applied research are clearly intimately intertwined. It is also a quintessentially interdisciplinary domain that requires the competences of physicists, chemists and even biologists at fundamental level, and then those of engineers to apply the research results.

At the Collège de France, an institution that inherently practices multi-disciplinarity, several recent Chairs have studied or are currently studying the properties of new...
materials from the perspective of fundamental research, in other words, they are seeking to understand their properties purely out of curiosity. Let us recall that Pierre-Gilles de Gennes was a pioneer in the physics of liquid crystals and polymers. Jacques Livage is one of the founding fathers of soft chemistry aimed at making bio-inspired materials based on the model of those developed by nature at a low temperature, like marine animals’ shells. And Antoine Georges currently holds a Chair that is concerned with the structure of complex materials such as the famous ceramics with supra-conductive properties at a high temperature, which still raise unresolved theoretical questions for physicists. The Collège de France is the ideal place to host a Chair of technological innovation focused on the way in which fundamental research on these materials, so crucial to the development of our way of life, ultimately leads to concrete applications and uses.

6 Yves Bréchet, you are certainly the ideal scientist for this Chair and for telling us about new materials from the different angles I have just mentioned. As a former student of the École polytechnique, you were steered towards materials science by Yves Quéré, and obtained your PhD from the Université Joseph Fourier in Grenoble where you became a professor, before joining the Institut universitaire de France. You specialised in the domain of materials modelling, particularly the modelling of metals and alloys, owing to a distinct taste for inter-disciplinarity and your desire to combine fundamental research with an engineering vision. Your work shares the common feature of drawing from industrial questions the key scientific issues that require fundamental research to further the development of increasingly high-performance materials. Though a theorist and specialist in digital modelling, you have always remained in close contact with experimenters and engineers. Your renown, which earned you the reputation of a sought-after scientific adviser for many private industrial companies and public research institutions, was recognised in 2010 with your election to the Académie des sciences.

7 Your studies on the ageing of materials, particularly on that of the materials used to build nuclear plants, are recognized and valued by the CEA. This is probably one of the reasons behind your nomination as High Commissioner for Atomic Energy. This is a position of great responsibility, which you attained after the Collège de France invited you to hold the Annual Chair of Technological Innovation. We are particularly grateful that you upheld your commitment to teach materials science at the Collège de France despite this very time-consuming responsibility. I now leave the floor to you.

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