

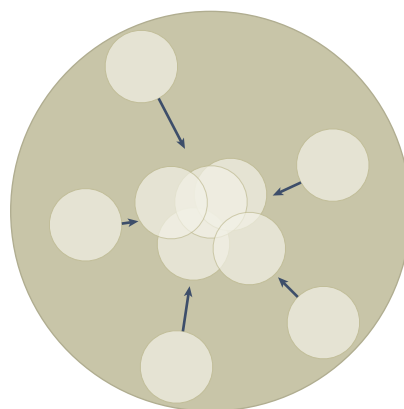
# In praise of interdisciplinary science

*Nature Nanotechnology* fosters and promotes integration among scientific disciplines.

In our first issue in October 2006, we asked several researchers to tell us what their idea of ‘nanotechnology’ was<sup>1</sup>. Quoting from that feature, Prof. Mauro Ferrari, a pioneer in nanomedicine, wrote: “At the nanoscale there is no difference between chemistry and physics, engineering, mathematics, biology or any subset thereof.” And therein lies the beauty of it. There’s something appealing and captivating in understanding, manipulating and engineering matter and interactions at the smallest possible level; and from such an understanding build structures and materials with novel and desired properties, in complete control of the structure–properties relationship. This perception transcends traditional scientific fields. Like a conceptual black hole, doing nanoscience and nanotechnology continues to attract practitioners from all sides. And it’s a party.

Exchanging ideas with researchers from different scientific background results many a times in pure intellectual delight and great collaborations, because looking sideways is always where the more interesting ideas come from. At its core, this great party of minds is what interdisciplinarity is about.

However, this wonderful world of being interdisciplinary is not without its practical downsides. There used to be — and still is in some pockets, sadly — the unjustified stigma that people decide to go interdisciplinary because they are not good enough at their traditional discipline. There is the issue that applying for grants requires specifying one’s own field of research and there are only a few grants specifically targeted to interdisciplinary research. There is the issue of belonging (or not) to a specific department that many a times is strongly anchored to a traditional field, with direct repercussions to promotion and tenure. There is the issue that, in order to productively collaborate with someone from a different field, one needs to find a common language — this can turn into a frustrating challenge. And then there is the issue of publishing one’s own work, where



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one of the most heard complaints is that it is generally hard for editors and reviewers to properly evaluate interdisciplinary work.

At *Nature Nanotechnology*, we are aware of this struggle. We are well-versed with papers spanning the traditional boundaries — our choice of reviewers and how we interpret their reports reflect this; and our text editing is designed to make results widely appreciated. We want to be the primary home of interdisciplinary science, because true to its history, this is how nanotechnology progresses. We are dedicated to highlighting success stories where interdisciplinary approaches have proven particularly productive.

We value the effort of looking outside the box, be it just for the thought-provoking ripples that such effort might emanate. In the end, the value we see in interdisciplinary research is that of borrowing from others techniques, tools and expertise, of looking at a problem from different angles and with time create something new: areas that defy traditional boundaries. Perhaps the most striking achievement of this interdisciplinary approach is nanomedicine, as the success of mRNA vaccines has recently shown. This calls for open-minded collaborations or, in a more compact guise, to set up one’s own research group in a way that already

comprises students, postdocs and staff members coming from various backgrounds, working on a complex problem.

In a multidisciplinary journal, papers from disparate disciplines stand side-by-side without much in common. Conceptually, the idea can be illustrated as circles, within an arena, without overlap among themselves<sup>2</sup>.

True, not every paper we publish is interdisciplinary science in a strict sense; and that is fine, because interdisciplinarity cannot survive without vertical investigations from which to draw on. But the effort of bridging gaps and creating common ground between disciplines will always be appreciated at *Nature Nanotechnology*. We see both approaches of doing nanoscience as extremely valuable and living alongside one another (see image, where now overlapping circles are the main actors). This is so, because all findings are going to pertain to the same length scale; ubiquitous phenomena operate at the nanoscale, such as quantum effects, van der Waals interactions, Brownian fluctuations, to name the most widely researched at the moment; findings that might seem specific to a certain system could appear in different guises in others.

One can then stretch this notion of interdisciplinary science more generally, as applied to tackling societal challenges in a holistic manner. But more on this in future editorials. Suffice to stress here that the benefits of interdisciplinary research go beyond publishing a good paper. They speak to a mindset where nothing is off the table, to the crucial need to open one’s own work to a broad audience of researchers and eventually policy makers. This implies developing a clarity of mind that reflects the way in which science is conveyed. □

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## References

1. *Nat. Nanotechnol.* 1, 8–10 (2006).
2. Jensenius, A. R. Disciplinarity: intra, cross, multi, inter, trans. (12 March 2012); <https://www.arj.no/2012/03/12/disciplinarity-2/>