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research on  
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Running ahead in the nanotechnology  
gold rush. Strategic patenting in  
emerging technologies.



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SUMMARY			
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## Abstract

The present paper aims to provide information on how patent scope varies over time and by type of applicants in the emerging phase of nanotechnology. Based on an analysis of 58.244 US patents, the authors conclude that the number of claims decreases over the subsequent phases of the technology life-cycle.

## Keywords

Intellectual Property rights; Nanotechnology; Patents;

## Summary

The dawn of new ground breaking technologies is accompanied by intense patent filing. A large number of filings can produce a thicket of conflicting legal claims and ultimately be the cause of legal disputes. The authors have analysed 58.244 patents issued by the United States Patent and Trademark Office, in order to provide theoretical and empirical insights on how patent scope varies over time and by type of applicants, in the initial phases of a new technology's life-cycle.<sup>1</sup>

Technology life-cycle models argue that technology development and the degree of market competition vary across different phases of the cycle.<sup>2</sup> The authors analysed the main perspectives taken by life-cycles literature. The first concerns the macrolevel of technology progression and technological trajectories. Called the 'S-curve perspective', it is characterized by the concept that every new technology's life-cycle begins with the end of another technology. That means that a breakthrough innovation affects a product or a process, then it is followed by a period of ferment during which competitors try to improve that technology. The cycle eventually ends up

<sup>1</sup> Munari, Federico / Toschi, Laura; Running ahead in the nanotechnology gold rush. Strategic patenting in emerging technologies (2012). Pg 195.

<sup>2</sup> *Ibid.*

with another breakthrough innovation that causes a technological discontinuity to the cycle.

Studies show that patenting activity follows the S-curve pattern. In the starting phase of new technologies, the number of patent applications tends to be low, increasing slowly and concentrated in a limited number of pioneering firms.<sup>3</sup> When the technology enters the growth phase, there is a rapid growth in the number of patent applications, due to the resolution of technical and market uncertainties.<sup>4</sup>

During the early stages of a technology, it is more likely that patent offices will grant patents with broader claims. The wording of the patent filings in new technologies is also less standardized than in more established fields.

The authors highlight that patents are not only used to defend proprietary inventions from the imitation of competitors; they are also used for strategic reasons, such as blocking competitors from developing rival technologies.<sup>5</sup> This use of patent protection has changed the number of patent filings and drafting styles over the last few decades. An empirical analysis should, therefore, consider that the number and the scope of claims contained in a patent filing are influenced by a series of institutional, technological and strategic factors.<sup>6</sup>

Due to the complexity of the subject and gaps in the literature, the authors chose to examine rigorously the predictions made by the existing literature. The authors undertook an analysis of patent scope in the field of nanotechnology.

Two different measures were used<sup>7</sup>: An absolute measure, representing the total number of patent claims, and a relative measurement based on the number of patent claims deflated by the median number of claims contained in patents within the same technological field.<sup>8</sup>

The authors found that the evolution of patent scope over time is different depending on the type of measure considered.<sup>9</sup> In absolute terms, the patent scope systematically increases along the four different phases of development (incubation, mobilization, legitimization and institutionalization).<sup>10</sup> However, from the relative perspective, the patent scope showed a systematic decline over the phases of development of nanotechnology.<sup>11</sup>

A presence of early broad patents was identified which was followed by later specialised patents. Likewise, patents by private companies tend to be less broad compared to patents filed by academic institutions, due to the fact that these institutions are often involved in the early stages of new technologies. Accordingly,

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<sup>3</sup> *Ibid*, 195.

<sup>4</sup> *Ibid*, 195.

<sup>5</sup> *Ibid*, 197.

<sup>6</sup> *Ibid*, 197.

<sup>7</sup> *Ibid*, 204.

<sup>8</sup> *Ibid*, 204.

<sup>9</sup> *Ibid*, 204.

<sup>10</sup> *Ibid*, 204.

<sup>11</sup> *Ibid*, 204.

patent filings from academic institutions have shown a higher level of originality compared to corporate filings.<sup>12</sup>

The authors highlighted the importance of strategically leveraging on patent protection in the early phases of a new technology's life-cycle in order to outrun competitors and generate future licensing revenues which could be the base of entire business models. To exemplify, a company could focus on the research and development of new technologies, apply for patents and earn royalties from licensing the technology to other companies.

Finally, the present study argues that patent offices should consider the dangers of awarding overly broad patents in the early stage of a technology's life-cycle. One of the dangers to be specifically considered with respect to nanotechnology is hindering the development of this technology due to the time and money required for inventors for acquiring all necessary licenses for the further development of the technology.<sup>13</sup>

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<sup>12</sup> *Ibid*, 205.

<sup>13</sup> *Ibid*, 205.